

=> fil reg

FILE 'REGISTRY' ENTERED AT 13:24:48 ON 14 DEC 2006
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(FILE 'HOME' ENTERED AT 10:47:15 ON 14 DEC 2006)

FILE 'HCAPLUS' ENTERED AT 10:48:37 ON 14 DEC 2006

L1 1 SEA WO2000-JP1370/AP

FILE 'REGISTRY' ENTERED AT 10:53:18 ON 14 DEC 2006

L2 1 SEA 9003-01-4/RN

L3 1 SEA "2-PROPENOIC ACID, 2-METHYL-, HOMOPOLYMER"/CN

FILE 'HCAPLUS' ENTERED AT 11:02:48 ON 14 DEC 2006

L4 24396 SEA L2 OR L3

L5 QUE POLYACRYLIC# OR POLYACRYLATE# OR POLYMETHACRYLIC# OR
POLYMETHACRYLATE# OR POLY(A) (ACRYLIC# OR ACRYLATE# OR
METHACRYLIC# OR METHACRYLATE#) OR (POLY OR POLYM? OR
COPOLYM? OR HOMOPOLYM? OR RESIN?) (2A) (ACRYLATE# OR
METHACRYLATE# OR ACRYLIC# OR METHACRYLIC#)

L6 QUE POLYM? OR COPOLYM? OR HOMOPOLYM? OR RESIN?

L7 QUE CONDUCT? OR COND#

L8 QUE GRAFT?

L9 QUE PROTON? OR H OR HYDROGEN#

L10 QUE PERMEA? OR PERFORAT? OR PORO? OR MICROPORO? OR
SIEVE? OR PERVIOUS? OR IMPERVIOUS? OR PENETRAT? OR
INFILTRAT? OR PERVA? OR SEMIPERMEA?

L11 QUE PERMEA? OR PORO? OR MICROPORO? OR SEMIPERMEA?

L12 QUE ELECTROLY?

L13 QUE MEMBRANE? (3A)L12

L14 404 SEA (L2 OR L3 OR L2/D OR L2/DP OR L3/D OR L3/DP) (L) (L8
OR L13)

L15 10 SEA L14 AND L9(2A)L7

L16 7 SEA L15 AND L10

L17 QUE SUBSTRAT? OR SURFACE? OR BASE# OR SUBSTRUCT? OR
UNDERSTRUCT? OR UNDERLAY? OR FOUNDATION? OR PANE?

L18 47273 SEA L10(2A)L17

L19 1 SEA L16 AND L18

L20 0 SEA L19 AND L8

L21 153 SEA (L4 OR L5 OR L6) (3A)L8 AND L9(2A)L7

L22 7 SEA L21 AND L18

L23 58 SEA L21 AND L13

L24 3 SEA L22 AND L23

L25 19 SEA L23 AND L10

L26 4 SEA L22 NOT L24

L27 16 SEA L25 NOT (L24 OR L26)

L28 QUE INORG# OR INORGANIC?

L29 QUE CERAMIC? OR GLASS?

L30 QUE (HEAT?(2A)(RESIST? OR REPEL?))(3A)L6

L31 2 SEA (L24 OR L26 OR L27) AND (L28 OR L29 OR L30)

L32 QUE MONOMER?

L33 QUE (FILL? OR FULFILL? OR BOUND? OR EMBED? OR INLAY? OR
INSERT? OR PLUNG?)(5A)L10

L34 QUE (FILL? OR FULFILL? OR BOUND? OR EMBED? OR INLAY? OR

INSERT? OR PLUNG?) (3A) L17
 L35 121 SEA L13 AND L32 AND L6 AND L9 (2A) L7
 L36 7 SEA L35 AND (L33 OR L34)
 L37 1 SEA L36 AND (L28 OR L29 OR L30)
 L38 0 SEA L36 AND L8 (2A) L6
 L39 7 SEA L36 OR L37
 L40 QUE FUEL? (2A) (CELL OR CELL#)
 L41 QUE SOL#
 L42 QUE ELECTROD##
 L43 3138 SEA L40 AND L41 AND L42
 L44 377 SEA L43 AND L13
 L45 11 SEA L44 AND (L33 OR L34)
 L46 10 SEA L45 AND L6
 L47 423 SEA L13 AND L10 AND L9 (2A) L7
 L48 346 SEA L47 AND L6
 L49 41 SEA L48 AND (L33 OR L34)
 L50 11 SEA L49 AND (L28 OR L29)
 L51 4 SEA L50 AND L29
 L52 19 SEA L47 AND L8 (2A) L6
 L53 1 SEA L52 AND (L33 OR L34)
 L54 QUE (NEGATIVE? OR NEG#) (A) ELECTROD## OR ANOD##
 L55 QUE (POSITIVE? OR POS#) (A) ELECTROD## OR CATHOD##
 L56 8 SEA L40 AND L54 AND L55 AND L10 AND L8 (2A) L6
 L57 0 SEA L56 AND (L33 OR L34)

=> fil hcap

FILE 'HCAPLUS' ENTERED AT 13:24:56 ON 14 DEC 2006

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=> d l24 ibib abs hitstr hitind 1-3

L24 ANSWER 1 OF 3 HCAPLUS COPYRIGHT 2006 ACS on STN
 ACCESSION NUMBER: 2006:443108 HCAPLUS
 DOCUMENT NUMBER: 144:471407
 TITLE: **Proton-conductive
electrolyte membranes for
polymer-electrolyte fuel cells, and
same fuel cells**
 INVENTOR(S): Emori, Hideyuki; Yamamoto, Kazunari
 PATENT ASSIGNEE(S): Nitto Denko Corp., Japan
 SOURCE: Jpn. Kokai Tokkyo Koho, 12 pp.
 CODEN: JKXXAF
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006120510	A2	20060511	JP 2004-308150	20041022
PRIORITY APPLN. INFO.:			JP 2004-308150	

200410

22

- AB The **electrolyte membranes** are constituted by **porous substrates** and **proton-conductive** polymers filled in the pores. The **porous substrates** are composed of (A) 50-99 weight% of first polymers containing polyolefins with weight-average mol. weight of $\geq 500,000$, and optionally thermoplastic elastomers and/or **graft copolymers**, and (B) 1-50 weight% of second polymers bearing double bond on main- or side chains whose $\geq 1\%$ is substituted with epoxy groups. The membranes show high **proton conductivity** and inhibit methanol permeation.
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 39
- ST **proton conductive polymer electrolyte membrane** fuel cell; polyolefin blend polymer electrolyte fuel cell
- IT Styrene-butadiene rubber, uses
RL: DEV (Device component use); USES (Uses)
(block, triblock, epoxidized, Epofriend A 1005, in **porous substrates of membranes; in proton-conductive electrolyte membranes for polymer-electrolyte fuel cells**)
- IT Polyolefins
Thermoplastic rubber
RL: DEV (Device component use); USES (Uses)
(in **porous substrates of membranes; proton-conductive electrolyte membranes for polymer-electrolyte fuel cells**)
- IT Fuel cells
(polymer electrolyte; **proton-conductive electrolyte membranes for polymer-electrolyte fuel cells**)
- IT Polyelectrolytes
(**proton-conductive; proton-conductive electrolyte membranes for polymer-electrolyte fuel cells**)
- IT 9002-88-4, Polyethylene
RL: DEV (Device component use); USES (Uses)
(in **porous substrates of membranes; proton-conductive electrolyte membranes for polymer-electrolyte fuel cells**)
- IT 69824-22-2P
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(**proton conductor, in pores of porous substrates; proton-conductive electrolyte membranes for polymer-electrolyte fuel cells**)
- IT 694491-73-1D, block, triblock, epoxidized 694491-73-1D, epoxidized
RL: DEV (Device component use); USES (Uses)
(styrene-butadiene rubber, Epofriend A 1005, in **porous substrates of membranes; in proton-conductive electrolyte membranes for polymer-electrolyte fuel cells**)

L24 ANSWER 2 OF 3 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2005:411921 HCAPLUS
DOCUMENT NUMBER: 143:98404

TITLE: Physico-chemical study of sulfonated polystyrene pore-filled **electrolyte membranes** by electrons induced grafting.

AUTHOR(S): Ismail, A. F.; Zubir, N.; Nasef, M. M.; Dahlan, K. M.; Hassan, A. R.

CORPORATE SOURCE: Membrane Research Unit, Faculty of Chemical and Natural Resources Engineering, Universiti Teknologi Malaysia, Skudai, Johor, 81310, Malay.

SOURCE: Journal of Membrane Science (2005), 254(1-2), 189-196
CODEN: JMESDO; ISSN: 0376-7388

PUBLISHER: Elsevier B.V.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Pore-filled polymer **electrolyte membranes** have been prepared as a potential proton exchange membrane by radiation induced grafting using simultaneous technique. The **porous substrate** films were grafted in a subsequent step after flooding the membranes pores with styrene monomer. The grafted films were then sulfonated in a post-grafting reactions. The influence of grafting conditions, i.e. irradiation dose and monomer concentration in correlation with the grafting yield (Y) have been investigated. The results showed that the grafting yield is increased for both conditions. The resulting membranes were then characterized by evaluating their physico-chemical properties such as ion exchange capacity, water uptake and **proton conductivity** as a function of grafting yield. The overall results showed that polystyrene grafts is successfully anchored within the pores of PTFE films during grafting and subsequently transformed into hygroscopic proton exchange regions after being sulfonated. The measured conductivity of the sulfonated polystyrene pore-filled **electrolyte PTFE membranes** achieved were approx. within the magnitude of 10⁻³ and 10⁻² S cm⁻¹ at room temperature and at higher operating temperature, resp.

CC 38-3 (Plastics Fabrication and Uses)

IT **Polymerization**
(**graft**, radiochem.; physico-chemical study of sulfonated polystyrene-polytetrafluoroethylene porous membranes prepared by electrons induced grafting)

IT **Ionic conductivity**
(**proton**; physico-chemical study of sulfonated polystyrene-polytetrafluoroethylene porous membranes prepared by electrons induced grafting)

IT 109211-02-1DP, Styrene-tetrafluoroethylene **graft copolymer**, sulfonated 109211-02-1P, Styrene-tetrafluoroethylene **graft copolymer**
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(physico-chemical study of sulfonated polystyrene-polytetrafluoroethylene porous membranes prepared by electrons induced grafting)

REFERENCE COUNT: 19 THERE ARE 19 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L24 ANSWER 3 OF 3 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2002:216383 HCAPLUS

DOCUMENT NUMBER: 136:234757

TITLE: **Electrolyte membrane**, fuel cell, and manufacture of the membrane and the

INVENTOR(S): cell
 PATENT ASSIGNEE(S): Yamaguchi, Takeo; Nakao, Shinichi
 SOURCE: Foundation for Scientific Technology Promotion,
 Jpn. Kokai Tokkyo Koho, 11 pp.
 CODEN: JKXXAF
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2002083612	A2	20020322	JP 2000-272203	20000907
PRIORITY APPLN. INFO.:				JP 2000-272203
				20000907

AB The **electrolyte membrane** has a **H** **conductive** polymer filled in the pores of a MeOH- and H₂O-non-swelling **porous substrate**. The membrane is prepared by bonding a 1st polymer with its 1 end to the pores of a **porous substrate**, swell resistant to organic solvent or water, and bonding a 2nd polymer to the other end of the 1st polymer; where the 2 polymers are the same or different but are both **H** **conductive**. The fuel cell has the **electrolyte membrane** between a cathode and an anode, and is prepared by forming a 1st electrode from a sol, forming a porous film on the electrode, forming an **electrolyte membrane** by the above method using the porous film, and applying a 2nd electrode on the **electrolyte membrane**.

IC ICM H01M008-02
 ICS C08J009-40; H01M008-10; C08L027-18; C08L079-08

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel cell **proton conducting** polymer **electrolyte membrane** manuf

IT Fuel cell electrolytes
 (structure and manufacture of **proton conducting polymer grafted** in porous Teflon **membranes** for fuel cell **electrolytes**)

IT Fluoropolymers, uses
 RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
 (structure and manufacture of **proton conducting polymer grafted** in porous Teflon **membranes** for fuel cell **electrolytes**)

IT 9002-84-0, Teflon
 RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
 (structure and manufacture of **proton conducting polymer grafted** in porous Teflon **membranes** for fuel cell **electrolytes**)

IT 79-10-7, Acrylic acid, uses 1184-84-5, Vinylsulfonic acid
 RL: MOA (Modifier or additive use); USES (Uses)

(structure and manufacture of **proton conducting polymer grafted in porous Teflon membranes for fuel cell electrolytes**)

=> d l26 ibib abs hitstr hitind 1-4

L26 ANSWER 1 OF 4 HCAPLUS COPYRIGHT 2006 ACS on STN
 ACCESSION NUMBER: 2006:1001330 HCAPLUS
 TITLE: **Proton conducting** membrane
 using multi-layer acid-base complex formation on
 porous PE film
 AUTHOR(S): Cho, M. S.; Son, H. D.; Nam, J. D.; Suh, S. J.;
 Lee, Y.
 CORPORATE SOURCE: Department of Chemical Engineering, Sungkyunkwan
 University, Suwon, 440-746, S. Korea
 SOURCE: Journal of Membrane Science (2006), 284(1+2),
 155-160
 CODEN: JMESDO; ISSN: 0376-7388
 PUBLISHER: Elsevier B.V.
 DOCUMENT TYPE: Journal
 LANGUAGE: English

AB A new type of **proton conducting** membrane was
 fabricated by multi-layer acid-base complex formation on a porous
 PE-g-PSS film. Polystyrene was initially grafted on a
porous PE substrate using a supercrit. carbon
 dioxide (s.c.-CO₂) medium, and the grafted polystyrene was
 subsequently sulfonated to yield the PE-g-PSS membrane. The
 multi-layer acid base complex structure was obtained by the
 repetitive alternating deposition of poly(vinylimidazole) and
 poly(2-acrylamido-2-methyl-1-propane-sulfonic acid) on the PE-g-PSS
 film. The multi-layer acid-base complex structure was designed to
 suppress methanol crossover due to the more compact pore-filling
 structure as well as to control the hydrophilicity. As expected,
 the methanol permeability of the optimized multi-layer membrane was
 much lower, however, the **proton conductivity** of the
 membrane was higher than that of Nafion 115.

CC 38-3 (Plastics Fabrication and Uses)
 Section cross-reference(s): 37, 76

ST membrane porous film PE styrene DVB surface grafting sulfonation;
 polyvinyl imidazole polyacrylamidomethyl propanesulfonic acid
 multilayer **proton cond** morphol

IT Membranes, nonbiological
 (composite; **proton conducting** membrane using
 multi layer acid-base complex formation on porous PE film)

IT Permeability
 (methanol permeability of **proton conducting**
 multi layer membrane)

IT Plastic films
 (porous; **proton conducting** membrane using
 multi layer acid-base complex formation on porous PE film)

IT Ion exchange
 Multilayers
 Polymer morphology
 Thickness
 Wetting
 (proton conducting membrane using multi layer
 acid-base complex formation on porous PE film)

IT Ionic conductivity
 (proton; **proton conducting** membrane)

- using multi layer acid-base complex formation on porous PE film)
- IT 7732-18-5, Water
RL: NUU (Other use, unclassified); USES (Uses)
(absorption; **proton conducting** membrane using
multi layer acid-base complex formation on porous PE film)
- IT 78-67-1, AIBN
RL: CAT (Catalyst use); USES (Uses)
(polymerization catalyst; **proton conducting** membrane
using multi layer acid-base complex formation on porous PE film)
- IT 67-56-1, Methanol
RL: NUU (Other use, unclassified); USES (Uses)
(**proton conducting** membrane using multi layer
acid-base complex formation on porous PE film)
- IT 7790-94-5DP, Chlorosulfonic acid, polyethylene-surface grafted
styrene-divinylbenzene sulfonation products
RL: PEP (Physical, engineering or chemical process); PRP
(Properties); PYP (Physical process); SPN (Synthetic preparation);
TEM (Technical or engineered material use); PREP (Preparation); PROC
(Process); USES (Uses)
(**proton conducting** membrane using multi layer
acid-base complex formation on porous PE film)
- IT 25232-42-2, Polyvinylimidazole 27119-07-9, poly(2-acrylamido-2-
methyl-1-propanesulfonic acid)
RL: PEP (Physical, engineering or chemical process); PYP (Physical
process); TEM (Technical or engineered material use); PROC
(Process); USES (Uses)
(**proton conducting** membrane using multi layer
acid-base complex formation on porous PE film)
- IT 9002-88-4, Polyethylene
RL: MSC (Miscellaneous); TEM (Technical or engineered material use);
USES (Uses)
(substrate, surface grafted; **proton conducting**
membrane using multi layer acid-base complex formation on porous
PE film)
- IT 124-38-9, Carbon dioxide
RL: NUU (Other use, unclassified); USES (Uses)
(supercrit.; **proton conducting** membrane using
multi layer acid-base complex formation on porous PE film)
- IT 112529-11-ODP, Ethylene-styrene-divinylbenzene **graft**
copolymer, sulfonated
RL: PEP (Physical, engineering or chemical process); PRP
(Properties); PYP (Physical process); SPN (Synthetic preparation);
TEM (Technical or engineered material use); PREP (Preparation); PROC
(Process); USES (Uses)
(surface **graft**; **proton conducting**
membrane using multi layer acid-base complex formation on porous
PE film)

REFERENCE COUNT: 34 THERE ARE 34 CITED REFERENCES AVAILABLE
FOR THIS RECORD. ALL CITATIONS AVAILABLE
IN THE RE FORMAT

L26 ANSWER 2 OF 4 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2003:554038 HCAPLUS

DOCUMENT NUMBER: 139:119905

TITLE: **Proton-conducting** sulfonated
polysulfone-polyethers and polyketone-polyethers
as fuel cell separators

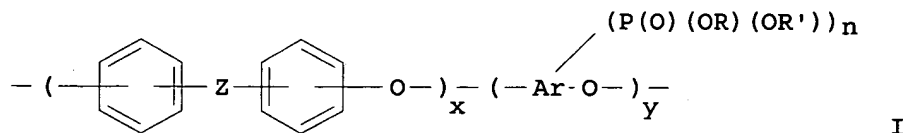
INVENTOR(S): Sasaki, Shigeru; Yashiro, Arihiro; Hidaka,
Yasuaki; Taniguchi, Yakumi

PATENT ASSIGNEE(S): Sumitomo Chemical Company Limited, Japan

SOURCE: Fr. Demande, 36 pp.
 CODEN: FRXXBL
 DOCUMENT TYPE: Patent
 LANGUAGE: French
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
FR 2834716	A1	20030718	FR 2003-385	20030115
FR 2834716	B1	20050311		
JP 2003206402	A2	20030722	JP 2002-5796	20020115
JP 2003282096	A2	20031003	JP 2002-369739	20021220
CA 2416580	AA	20030715	CA 2003-2416580	20030114
DE 10301063	A1	20030904	DE 2003-10301063	20030114
US 2003166824	A1	20030904	US 2003-341500	20030114
US 6828407	B2	20041207		
GB 2386375	A1	20030917	GB 2003-810	20030114
GB 2386375	B2	20050713		
CN 1432604	A	20030730	CN 2003-101587	20030115
PRIORITY APPLN. INFO.:			JP 2002-5796	A 20020115
			JP 2002-5797	A 20020115

OTHER SOURCE(S): MARPAT 139:119905
 GI



AB Proton-conducting polymer membranes, especially for fuel cells, are phosphonic acid-containing polyether-polyketones or polyether-polysulfones, of general structure I, in which Z = -SO₂-

or -C(:O)-; x and y = 0.01-0.99 (x + y = 1); -Ar- is a C4-18-arylene and can contain heteroatoms; n ≤ 8; and R and R' = H or alkyl, in addition to at least one other component selected from phosphoric acid (or derivative) and a polymer electrolyte. The polymer has a **proton conductivity** of $\geq 1 \times 10^{-4}$ S/cm. The phosphoric acid derivative has the general formula $O:P(OR_2)_k(OH)_{3-k}$, in which R_2 = C1-6-alkyl or an aryl group, and; k = 0-2. The phosphonic acid groups are **grafted** onto the **polymer** by bromination with N-bromosuccinimide, followed by reaction with tri-Et phosphite in the presence of NiCl₂.

IC ICM C08L071-12

ICS C08K005-521; C08J005-22; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST fuel cell **proton conducting** membrane polysulfone polyether; sulfonated polysulfone polyether fuel cell membrane; polyketone polyether fuel cell **proton conducting** membrane

IT Polyketones

Polysulfones, uses

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(polyether-, aromatic, sulfonated, phosphonic acid-containing; **proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)

IT Polysulfones, uses

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(polyether-polyoxyphenylene-, aromatic, block, sulfonated, phosphonic acid-containing; **proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)

IT Polyoxyphenylenes

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(polyether-polysulfone-, aromatic, block, sulfonated, phosphonic acid-containing; **proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)

IT Polyethers, uses

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(polyketone-, aromatic, sulfonated, phosphonic acid-containing; **proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)

IT Polyethers, uses

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(polyoxyphenylene-polysulfone-, aromatic, block, sulfonated, phosphonic acid-containing; **proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)

IT Polyethers, uses

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(polysulfone-, aromatic, sulfonated, phosphonic acid-containing; **proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell

- separators)
- IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(porous substrates; proton-conducting sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)
- IT Fuel cell separators
(proton-conducting sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)
- IT Ionic conductivity
(proton; proton-conducting sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)
- IT 122-52-1DP, Triethyl phosphite, reaction products with sulfonated brominated polysulfone-polyethers 25839-81-ODP, Poly(oxy[1,1'-biphenyl]-4,4'-diyl-oxy-1,4-phenylenesulfonyl-1,4-phenylene), sulfonated, brominated, reaction products with tri-Et phosphite 83094-08-ODP, sulfonated 83094-08-ODP, sulfonated, brominated, reaction products with tri-Et phosphite
RL: DEV (Device component use); PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent); USES (Uses)
(membranes; proton-conducting sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)
- IT 13598-36-2DP, Phosphonic acid, aryl and polymeric derivs. 174899-22-ODP, sulfonated
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(membranes; proton-conducting sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)

L26 ANSWER 3 OF 4 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1998:393158 HCAPLUS
DOCUMENT NUMBER: 129:128184
TITLE: Electrochemical characterization of PVDF-based proton conducting membranes for fuel cells
AUTHOR(S): Lehtinen, T.; Sundholm, G.; Holmberg, S.; Sundholm, F.; Bjornbom, P.; Bursell, M.
CORPORATE SOURCE: Lab. Physical Chem. and Electrochemistry, Helsinki Univ. Tech., FIN-02015, Finland
SOURCE: Electrochimica Acta (1998), 43(12-13), 1881-1890
CODEN: ELCAAV; ISSN: 0013-4686
PUBLISHER: Elsevier Science Ltd.
DOCUMENT TYPE: Journal
LANGUAGE: English

AB The electrochem. characterization of proton-conducting membranes prepared by irradiation-induced grafting and subsequent sulfonation of PVDF films has been performed. In particular, measurements of the ionic conductivity, oxygen solubility and diffusion in the membranes are presented, as well as kinetic data for the oxygen reduction reaction in a membranes are presented, as well as performance of these PVDF-g-PSSA membranes in a solid polymer electrolyte fuel cell using a microcathode technique. At sufficient degrees of grafting (>40%) the conductivity reaches 0.1 S_{cm}⁻¹, well above that of Nafion 117 (DuPont). The PVDF-g-PSSA membranes show lower solubilities and higher diffusion coeffs. of oxygen and a higher

water uptake than Nafion 117. The microcathode measurements indicate that those PVDF-g-PSSA membranes which have conductivity higher than that of Nafion 117 may also give improved performance in fuel cell conditions provided that they have the necessary mech. and chemical stability.

- CC 72-2 (Electrochemistry)
Section cross-reference(s): 36, 38, 52, 74
- ST **proton conducting** membrane fuel cell
electrochem; oxygen soly diffusion microcathode conducting membrane;
styrene vinylidene fluoride **graft polymer**
membrane
- IT Conducting polymers
(PVDF-based **proton conducting** membranes for
fuel cells)
- IT Stability
(chemical, of PVDF-based **proton conducting**
membranes for fuel cells)
- IT Films
(elec. conductive; of PVDF-based **proton**
conducting membranes for fuel cells)
- IT Fuel cells
(electrochem. characterization of PVDF-based **proton**
conducting membranes for)
- IT Cation exchange membranes
(electrochem. characterization of PVDF-based **proton**
conducting membranes for fuel cells)
- IT Fluoropolymers, uses
RL: NUU (Other use, unclassified); PRP (Properties); USES (Uses)
(electrochem. characterization of PVDF-based **proton**
conducting membranes for fuel cells)
- IT Reduction kinetics
(electrochem.; of oxygen in contact with PVDF-based
proton conducting membrane electrode)
- IT Electric conductors
(films; of PVDF-based **proton conducting**
membranes for fuel cells)
- IT Limiting current
(for oxygen reduction for PVDF-based **proton**
conducting membranes)
- IT Permeation
(gas permeation of PVDF-based **proton**
conducting membranes for fuel cells)
- IT Diffusion
(gas; of oxygen in PVDF-based **proton conducting**
membranes)
- IT Exchange current (electric)
(in electroredn. of oxygen on platinum in contact with PVDF-based
proton conducting membrane)
- IT Sulfonation
(of PVDF-based **proton conducting** membranes by
chlorosulfonic acid in THF)
- IT Electrolytic polarization
(of PVDF-based **proton conducting** membranes
for fuel cells)
- IT Solubility
(of oxygen in PVDF-based **proton conducting**
membrane electrode)
- IT Reduction, electrochemical
(of oxygen on PVDF-based **proton conducting**
membrane electrode)

- IT Solid electrolytes
(polymeric; electrochem. characterization of PVDF-based **proton conducting** membranes for fuel cells)
- IT Ionic conductivity
(**proton**; of PVDF-based **proton conducting** membranes for fuel cells)
- IT 109955-91-1D, Styrene-vinylidene fluoride **graft copolymer**, sulfonated
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(electrochem. characterization of PVDF-based **proton conducting** membranes for fuel cells)
- IT 66796-30-3, Nafion 117
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(electrochem. characterization of PVDF-based **proton conducting** membranes for fuel cells and comparison with)
- IT 7440-06-4, Platinum, uses
RL: NUU (Other use, unclassified); PRP (Properties); USES (Uses)
(electrochem. reduction of oxygen on platinum in contact with PVDF-based **proton conducting** membranes)
- IT 67-66-3, uses
RL: NUU (Other use, unclassified); PRP (Properties); USES (Uses)
(extracting of unreacted monomer from PVDF-based **proton conducting** membranes after radiation-induced **graft copolymn.** with styrene)
- IT 7790-94-5, Chlorosulfuric acid
RL: PEP (Physical, engineering or chemical process); PRP (Properties); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(in sulfonation of PVDF-based **proton conducting** membranes for fuel cells)
- IT 109-99-9, uses
RL: NUU (Other use, unclassified); PRP (Properties); USES (Uses)
(radiation-induced **graft copolymn.** of polyvinylidene fluoride with styrene in)
- IT 100-42-5, properties
RL: PEP (Physical, engineering or chemical process); PRP (Properties); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(radiation-induced **graft copolymn.** with polyvinylidene fluoride for formation PVDF-based **proton conducting** membranes for fuel cells)
- IT 7782-44-7, Oxygen, properties
RL: PRP (Properties)
(solubility and diffusion in PVDF-based **proton conducting** membranes for fuel cells and electroredn. of oxygen at platinum with OVDF-based **proton conducting** membrane)
- IT 7732-18-5, Water, properties
RL: PRP (Properties)
(uptake of PVDF-based **proton conducting** membranes for fuel cells)

REFERENCE COUNT: 32 THERE ARE 32 CITED REFERENCES AVAILABLE
FOR THIS RECORD. ALL CITATIONS AVAILABLE
IN THE RE FORMAT

L26 ANSWER 4 OF 4 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1993:584673 HCAPLUS
DOCUMENT NUMBER: 119:184673
TITLE: Materials research aspects of organic solid

proton conductors
 AUTHOR(S): Gupta, B.; Buechi, F. N.; Scherer, G. G.; Chapiro, A.
 CORPORATE SOURCE: Paul Scherrer Institute, Villigen PSI, CH-5232, Switz.
 SOURCE: Solid State Ionics (1993), 61(1-3), 213-18
 CODEN: SSIOD3; ISSN: 0167-2738
 DOCUMENT TYPE: Journal
 LANGUAGE: English
 AB Proton exchange membranes were synthesized by simultaneous radiation grafting of styrene onto Teflon-FEP films and subsequent sulfonation. Grafted films and sulfonated membranes were characterized ex-situ, and in-situ in H/O fuel cells. The specific resistivity of the membranes was 2-5 Ω -cm at 20°. Tests in fuel cells indicate that the gas permeability and surface properties of the membranes need improvement for practical application.
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38
 IT Fuel cells
 (hydrogen-oxygen, styrene-Teflon **proton conductor** membranes for)
 IT Cation exchangers
 (membranes, styrene-Teflon, **proton conductors**, for fuel cells)
 IT 25134-67-2D, Styrene-tetrafluoroethylene **copolymer**, sulfonated
 RL: USES (Uses)
 (graft, membranes, resistivity of, for fuel cells)

=> d 127 ibib abs hitstr hitind 1-16

L27 ANSWER 1 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
 ACCESSION NUMBER: 2006:1069959 HCAPLUS
 DOCUMENT NUMBER: 145:422607
 TITLE: Process for fabrication of solid polymer electrolyte membrane for fuel cell
 INVENTOR(S): Takahashi, Norifumi; Ohba, Toshio; Kawada, Nobuo
 PATENT ASSIGNEE(S): Shin-Etsu Chemical Co., Ltd., Japan
 SOURCE: U.S. Pat. Appl. Publ., 5pp.
 CODEN: USXXCO
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2006228609	A1	20061012	US 2006-401249	20060411
JP 2006291059	A2	20061026	JP 2005-114427	20050412
PRIORITY APPLN. INFO.:			JP 2005-114427	A 20050412

AB The present invention relates to a solid polymer **electrolyte membrane** having both of a higher **proton conductivity** and a smaller methanol **permeability**, which can be produced by conducting a **graft polymerization** of a fluoro-resin thin membrane irradiated with a radiation with a monofunctional monomer and again irradiating the resulting film with a radiation, followed by conducting a **graft polymn** thereof with a polyfunctional monomer; and a high-performance fuel cell comprising the solid polymer **electrolyte membrane**, a fuel electrode and an air electrode, the solid polymer **electrolyte membrane** being disposed between the fuel electrode and the air electrode.

INCL 429033000; 521027000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST fuel cell solid polymer **electrolyte membrane**

IT Fuel cells
(direct methanol; process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT **Polymerization**
(**graft**; process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT Electron beams
(irradiation; process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT Perfluoro compounds
Vinyl compounds, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(perfluoroalkyl vinyl ether polymers, tetrafluoroethylene-; process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT Ethers, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(perfluoroalkyl vinyl, polymers, tetrafluoroethylene-; process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT Fuel cells
(polymer electrolyte; process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT Fuel cell electrolytes
(process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT Fluoropolymers, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT 116-14-3D, Tetrafluoroethylene, copolymer with perfluoroalkyl vinyl ether 9002-84-0, PTFE 25038-71-5, Ethylene-tetrafluoroethylene copolymer 25067-11-2, Hexafluoropropylene-tetrafluoroethylene copolymer
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)

(process for fabrication of solid polymer **electrolyte**
membrane for fuel cell)

IT 120965-78-8P, Divinylbenzene-styrene **graft**
copolymer 197895-58-2P, Ethylene-tetrafluoroethylene-
styrene **graft copolymer**
RL: DEV (Device component use); SPN (Synthetic preparation); PREP
(Preparation); USES (Uses)
(process for fabrication of solid polymer **electrolyte**
membrane for fuel cell)

IT 67-56-1, Methanol, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(process for fabrication of solid polymer **electrolyte**
membrane for fuel cell)

L27 ANSWER 2 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:1065764 HCAPLUS

DOCUMENT NUMBER: 145:400973

TITLE: Membrane-electrode assemblies with
porous catalyst layers and polymer
electrolyte fuel cells using them

INVENTOR(S): Kashino, Hiroshi

PATENT ASSIGNEE(S): Hitachi Maxell Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 17pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2006278022	A2	20061012	JP 2005-92235	200503 28
PRIORITY APPLN. INFO.: JP 2005-92235				200503 28

AB The membrane-electrode assemblies (MEA) have **porous**
catalyst layers containing catalysts, **porous** elec.
conductors, and **proton conductors**,
wherein the **proton conductors** are located in at
least a part of pores with size $\geq 0.1 \mu\text{m}$ of the elec.
conductors. Total area of pores with size $0.1\text{-}10 \mu\text{m}$ is
 $\geq 10\%$ to that of pores with size $\geq 10 \text{ nm}$ and ≤ 100
 μm . The MEA are manufactured by polymerization of **proton-**
conductive monomers in the presence of catalysts and
porous elec. conductors, or polymerization of proton-nonconductive
monomers in the presence of the catalysts and elec. conductors, and
introduction of **proton-conductive** groups onto
the resulting polymers, and size reduction or granulation of the
resulting polymer-elec. conductor composites. Three-phase
(catalysts, **porous** elec. **conductors**, and
proton conductors) interfaces are effectively
formed in the catalyst layers without lowering diffusion property of
fuels or oxidants.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

IT Graphitized carbon black

RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)

(Ketjen Black EC, sulfo-containing **graft polymers**; membrane-electrode assemblies with **porous catalyst** layers for polymer electrolyte fuel cells)

IT Catalysts

(electrocatalysts; membrane-electrode assemblies with **porous catalyst** layers for polymer electrolyte fuel cells)

IT Polyoxyalkylenes, uses

RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)

(fluorine- and sulfo-containing, ionomers, Nafion; membrane-electrode assemblies with **porous catalyst** layers for polymer electrolyte fuel cells)

IT Electric conductors

Fuel cell electrodes

Pore size distribution

(membrane-electrode assemblies with **porous catalyst** layers for polymer electrolyte fuel cells)

IT Fuel cells

(polymer **electrolyte**; membrane-electrode assemblies with **porous catalyst** layers for polymer electrolyte fuel cells)

IT Fluoropolymers, uses

RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)

(polyoxyalkylene-, sulfo-containing, ionomers, Nafion; membrane-electrode assemblies with **porous catalyst** layers for polymer electrolyte fuel cells)

IT Ionomers

RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)

(polyoxyalkylenes, fluorine- and sulfo-containing, Nafion; membrane-electrode assemblies with **porous catalyst** layers for polymer electrolyte fuel cells)

IT Ionic conductors

(**protonic**; membrane-electrode assemblies with **porous catalyst** layers for polymer electrolyte fuel cells)

IT 7440-06-4, Platinum, uses 7440-44-0, Carbon, uses 11134-15-9
12623-53-9 12779-05-4 39339-47-4 51402-57-4

RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)

(membrane-electrode assemblies with **porous catalyst** layers for polymer electrolyte fuel cells)

IT 100-42-5DP, Styrene, polymer with graphitized carbon black, graft, sulfonated 106-91-2DP, Glycidyl methacrylate, polymer with graphitized carbon black and sodium styrenesulfonate, graft

2695-37-6DP, Sodium p-styrenesulfonate, polymer with graphitized carbon black and glycidyl methacrylate, graft

RL: CAT (Catalyst use); DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)

(membrane-electrode assemblies with **porous catalyst** layers for polymer electrolyte fuel cells)

L27 ANSWER 3 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:978191 HCAPLUS

DOCUMENT NUMBER: 145:336749

TITLE: **Graft polymer, polymer electrolyte membrane, method for producing the same, and fuel cell using the same**

INVENTOR(S): Takagi, Shigeharu; Higa, Mitsuru

PATENT ASSIGNEE(S): Toyota Jidosha Kabushiki Kaisha, Japan;
 SOURCE: Yamaguchi University
 PCT Int. Appl., 35pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2006098484	A2	20060921	WO 2006-JP305627	20060315
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
JP 2006291161	A2	20061026	JP 2005-254861	20050902
PRIORITY APPLN. INFO.: JP 2005-75790 A 20050316 JP 2005-254861 A 20050902				

AB This invention provides a **graft polymer** that has excellent **proton conductivity**, is capable of regulating hydrogen **permeability**, methanol **permeability**, and the like, and can serve as a starting material for a polymer **electrolyte membrane**, which facilitates moisture balance control and efficient operation of a fuel cell. A polymer **electrolyte membrane** composed of such **graft polymer** is also provided. This **graft polymer** comprises a main chain comprising a hydroxyl group-containing **polymer** and a **graft chain** comprising a **polymer** containing a sulfonic acid group-containing monomer (e.g., AMPS).

CC 37-3 (Plastics Manufacture and Processing)
 Section cross-reference(s): 52

ST vinyl alc sulfonic acid monomer **graft copolymer**
electrolyte membrane

IT **Membranes**, nonbiological
 (electrolyte; **graft polymer**,
 polymer **electrolyte membrane**, method
 for producing the same, and fuel cell using the same)

IT Fuel cells
 (graft **polymer**, polymer)

electrolyte membrane, method for producing the same, and fuel cell using the same)

IT **Electrolytes**

(membrane; graft polymer, polymer electrolyte membrane, method for producing the same, and fuel cell using the same)

IT 338446-39-2P, 2-Acrylamido-2-methyl-1-propanesulfonic acid-vinyl alcohol graft copolymer

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(graft polymer, polymer electrolyte membrane, method for producing the same, and fuel cell using the same)

L27 ANSWER 4 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:886444 HCAPLUS

DOCUMENT NUMBER: 145:274857

TITLE: Method of fabrication of functional membrane and electrolyte membrane for fuel cells

INVENTOR(S): Takagi, Shigeharu; Kobayashi, Misaki; Saito, Toshiya; Yoshida, Masaru; Asano, Masaharu; Yamaki, Tetsuya

PATENT ASSIGNEE(S): Japan Atomic Energy Agency, Japan; Toyota Jidosha Kabushiki Kaisha

SOURCE: PCT Int. Appl., 41pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2006090862	A1	20060831	WO 2006-JP303504	20060220
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
JP 2006233086	A2	20060907	JP 2005-51525	20050225
PRIORITY APPLN. INFO.:			JP 2005-51525	A
				20050225

AB A functional membrane is provided, which has high functionality combined with the gas barrier performance and mech. strength inherent in a polymer film substrate. In particular, a polymer

electrolyte membrane is provided, which is excellent in terms of high **proton conductivity** and gas barrier performance and is most appropriate to serve as a polymer **electrolyte membrane** for fuel cells. A method for producing a functional membrane is provided, which comprises: a step of ion irradiation, in which active species are generated in a polymer film substrate containing nonconductive inorg. particles by irradiating the polymer film substrate with high-energy heavy ions to the extent of 104/cm2 to 1014/cm2; and a step of **graft polymn** . subsequent to the step of ion irradiation, in which one or more monomers selected from group A consisting of monomers containing useful functional groups are added such that the monomers are **graft polymerized** with the **polymer** film substrate.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

ST fuel cell **electrolyte membrane** fabrication

IT Polyimides, uses

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(divinylbenzene-methylstyrene **copolymer grafted** on; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Polymers, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(films; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Membranes, nonbiological

(functional; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT **Polymerization**

(**graft**; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Particles

(inorg.; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Electron beams

Plasma

(irradiation; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Fuel cell electrolytes

Gamma ray

Ion bombardment

Permeability

(method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Fluoropolymers, uses

Mordenite-type zeolites

RL: DEV (Device component use); USES (Uses)

(method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Fuel cells

(polymer electrolyte; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Hydrocarbons, uses

RL: DEV (Device component use); USES (Uses)

(polymers; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Ionic conductivity

- (proton; method of fabrication of functional membrane and electrolyte membrane for fuel cells)
- IT 7782-44-7, Oxygen, processes
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
 (method of fabrication of functional membrane and electrolyte membrane for fuel cells)
- IT 1314-23-4, Zirconia, uses 1344-28-1, Alumina, uses 7631-86-9, Silica, uses
 RL: DEV (Device component use); USES (Uses)
 (method of fabrication of functional membrane and electrolyte membrane for fuel cells)
- IT 9003-53-6DP, sulfonated, sodium salt 39317-52-7DP, grafted on polyimide 239477-89-5P, Divinylbenzene-styrene-vinylidene fluoride graft copolymer 907191-17-7P 907191-18-8P 907191-19-9P
 RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
 (method of fabrication of functional membrane and electrolyte membrane for fuel cells)
- REFERENCE COUNT: 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L27 ANSWER 5 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:881536 HCAPLUS
 DOCUMENT NUMBER: 145:420077
 TITLE: Single radiation-induced grafting method for the preparation of two proton- and lithium ion-conducting membranes
 AUTHOR(S): Nasef, Mohamed Mahmoud; Saidi, Hamdani
 CORPORATE SOURCE: Business and Advanced Technology Centre (BATC), Universiti Teknologi Malaysia, Kuala Lumpur, 54100, Malay.
 SOURCE: Macromolecular Materials and Engineering (2006), 291(8), 972-983
 CODEN: MMENFA; ISSN: 1438-7492
 PUBLISHER: Wiley-VCH Verlag GmbH & Co. KGaA
 DOCUMENT TYPE: Journal
 LANGUAGE: English

AB Two distinct types of polymer electrolyte membranes for conducting protons and lithium ions have been prepared by a radiation-induced grafting method. The polymer electrolyte precursor (PVDF-g-PS) is obtained by the simultaneous grafting of styrene onto poly(vinylidene fluoride) (PVDF) followed by one of two specific treatments. This includes sulfonation with a chlorosulfonic acid/dichloromethane mixture to obtain proton (H⁺)-conducting membranes, or activation with LiPF₆/EC/DC liquid electrolyte to obtain lithium ion (Li⁺)-conducting membranes. The chemical structure of the obtained electrolyte membranes is verified by FT-IR spectroscopy. Differential scanning calorimetry is used to examine the changes in the crystallinity and the thermal properties of both electrolyte membranes during the preparation process. The thermal stability of both electrolyte membranes is also evaluated using thermal gravimetric anal. The obtained polymer electrolyte membranes achieve superior conductivity values: $1.61 \times 10^{-3} \text{ S} \cdot \text{cm}^{-1}$ for Li⁺ and $5.95 \times 10^{-2} \text{ S} \cdot \text{cm}^{-1}$ for H⁺ at room temperature at a

polystyrene content of 50%. The results of this work suggest that high quality H⁺- and Li⁺-conducting membranes can be obtained using a single radiation-induced grafting method.

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 35, 37, 76

IT **Polymerization**
(**graft**, radiochem.; single radiation-induced grafting for preparation of two proton- and lithium ion-conducting membranes)

IT Battery electrolytes
Crystallinity
Crystallization temperature
Fuel cells
Fusion enthalpy
Ion exchange
Ionic conductivity
Polymer electrolytes
Porosity
Swelling, physical
(single radiation-induced grafting for preparation of two proton- and lithium ion-conducting membranes)

IT 7790-94-5DP, Chlorosulfonic acid, reaction products with styrene-vinylidene fluoride **graft copolymer**
21324-40-3DP, reaction products with styrene-vinylidene fluoride **graft copolymer** 109955-91-1DP,
Styrene-Vinylidenefluoride **graft copolymer**,
reaction products with chlorosulfonic acid or with lithium hexafluorophosphate
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); SPN (Synthetic preparation); PREP (Preparation); PROC (Process); USES (Uses)
(single radiation-induced **grafting** for preparation of two proton- and lithium ion-conducting membranes)

REFERENCE COUNT: 47 THERE ARE 47 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L27 ANSWER 6 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:849354 HCAPLUS
DOCUMENT NUMBER: 145:274826
TITLE: **Electrolyte membrane**, its manufacture, fuel cell, and electronic apparatus
INVENTOR(S): Hasegawa, Aino; Kimura, Okitoshi; Tanaka, Masaharu
PATENT ASSIGNEE(S): Ricoh Co., Ltd., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 14pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2006221873	A2	20060824	JP 2005-32179	20050208
PRIORITY APPLN. INFO.:			JP 2005-32179	200502

08

- AB The **electrolyte membrane** contain nonionic copolymers and phosphate group-containing resins in a **porous** membrane and is manufactured by impregnating a **porous** membrane with liquid containing nonionic copolymers and phosphate group-containing monomers and polymerizing the monomers. The fuel cell has the **electrolyte membrane**, and the electronic apparatus uses the cell. The **electrolyte membrane** shows high **proton conductivity** and low fuel crossover.
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 76
- ST **electrolyte membrane** nonionic copolymer
phosphate resin fuel cell; electronic app fuel cell
electrolyte membrane
- IT Electric apparatus
Fuel cell **electrolytes**
Fuel cells
(**electrolyte membrane** containing nonionic copolymers and phosphate-containing resins and its manufacture for fuel cell used in electronic apparatus)
- IT Fluoropolymers, uses
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(graft; **electrolyte membrane** containing nonionic copolymers and phosphate-containing resins and its manufacture for fuel cell used in electronic apparatus)
- IT Ionic conductors
(**protonic; electrolyte membrane** containing nonionic copolymers and phosphate-containing resins and its manufacture for fuel cell used in electronic apparatus)
- IT 25190-89-0P, Propylene fluoride-tetrafluoroethylene-vinylidene fluoride copolymer 51131-63-6P 110671-41-5P 906088-87-7P, tert-Butylperoxyallyl carbonate-chlorofluoroethylene-vinylidene fluoride **graft copolymer**
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(**electrolyte membrane** containing nonionic copolymers and phosphate-containing resins and its manufacture for fuel cell used in electronic apparatus)
- IT 64-17-5, Ethanol, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(fuel; **electrolyte membrane** containing nonionic copolymers and phosphate-containing resins and its manufacture for fuel cell used in electronic apparatus)
- IT 9003-07-0, Polypropylene
RL: TEM (Technical or engineered material use); USES (Uses)
(**porous, membrane matrix; electrolyte membrane** containing nonionic copolymers and phosphate-containing resins and its manufacture for fuel cell used in electronic apparatus)

L27 ANSWER 7 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:838551 HCAPLUS

DOCUMENT NUMBER: 145:400617

TITLE: Polymer **electrolyte membranes**
for the direct methanol fuel cell: a review

AUTHOR(S): Deluca, Nicholas W.; Elabd, Yossef A.

CORPORATE SOURCE: Department of Chemical and Biological
Engineering, Drexel University, Philadelphia,
PA, 19104, USA

SOURCE: Journal of Polymer Science, Part B: Polymer Physics (2006), 44(16), 2201-2225
CODEN: JPBPEM; ISSN: 0887-6266

PUBLISHER: John Wiley & Sons, Inc.

DOCUMENT TYPE: Journal; General Review

LANGUAGE: English

AB A review. The direct methanol fuel cell (DMFC) has the potential to replace lithium-ion rechargeable batteries in portable electronic devices, but currently experiences significant power d. and efficiency losses due to high methanol crossover through polymer **electrolyte membranes** (PEMs). Numerous publications document the synthesis and characterization of new PEMs for the DMFC. This article reviews this research, transport phenomena in PEMs, and exptl. techniques used to evaluate new PEMs for the DMFC. Although many PEMs do not show significant improvements over Nafion, the benchmark PEM in DMFCs, exptl. results show that several new PEMs exhibit lower methanol crossover at similar **proton conductivities** and/or higher DMFC power densities. These results and recommendations for future research are discussed.

CC 52-0 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 36

ST review polymer **electrolyte membrane** methanol fuel cell doping cond

IT Ionomers
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(acrylic, sulfo- group-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Polyimides, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(aromatic, sulfo- containing; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Polymers, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(co-, block and random; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Membranes, nonbiological
(composite; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Fluoropolymers, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(composites and IPNs; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Heteropoly acids
RL: DEV (Device component use); USES (Uses)
(dopants; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Electroosmosis
(drag; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Membranes, nonbiological
(elec. conductive; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Polyoxyalkylenes, uses
RL: DEV (Device component use); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)

- (fluorine- and sulfo-containing, ionomers, benchmark
membranes; of polymer electrolyte
membranes for direct methanol fuel cell)
- IT Ionomers
 RL: DEV (Device component use); TEM (Technical or engineered
 material use); USES (Uses)
 (fluoropolymers, sulfo-containing; of polymer **electrolyte**
membranes for direct methanol fuel cell)
- IT **Polymers, uses**
 RL: DEV (Device component use); TEM (Technical or engineered
 material use); USES (Uses)
 (graft; of **polymer electrolyte**
membranes for direct methanol fuel cell)
- IT Fluoropolymers, uses
 RL: DEV (Device component use); TEM (Technical or engineered
 material use); USES (Uses)
 (ionomers, sulfo-containing; of polymer **electrolyte**
membranes for direct methanol fuel cell)
- IT Coating process
 (metalization, sulfo- group-containing; of polymer
electrolyte membranes for direct methanol fuel
 cell)
- IT **Permeability**
 (of membranes to methanol; of polymer **electrolyte**
membranes for direct methanol fuel cell)
- IT **Permeation**
 (of methanol; of polymer **electrolyte membranes**
 for direct methanol fuel cell)
- IT Ceramers
 Fillers
 Fuel cell separators
 Interpenetrating polymer networks
 Polyelectrolytes
 Polymer **electrolytes**
 (of polymer **electrolyte membranes for direct**
 methanol fuel cell)
- IT Polymer blends
 RL: DEV (Device component use); USES (Uses)
 (of polymer **electrolyte membranes for direct**
 methanol fuel cell)
- IT Absorption
 (of water; of polymer **electrolyte membranes**
 for direct methanol fuel cell)
- IT Polyphosphazenes
 RL: DEV (Device component use); TEM (Technical or engineered
 material use); USES (Uses)
 (phenoxy, sulfo- containing; of polymer **electrolyte**
membranes for direct methanol fuel cell)
- IT Polyimides, uses
 RL: DEV (Device component use); TEM (Technical or engineered
 material use); USES (Uses)
 (polybenzimidazole-, sulfo- containing; of polymer
electrolyte membranes for direct methanol fuel
 cell)
- IT Polyketones
 Polysulfones, uses
 RL: DEV (Device component use); TEM (Technical or engineered
 material use); USES (Uses)
 (polyether-, ionomers, sulfo-containing; of polymer
electrolyte membranes for direct methanol fuel

- cell)
- IT Polysulfones, uses
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
 (polyether-, phthalazinone group-containing, polyketone-, sulfo-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
- IT Polybenzimidazoles
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
 (polyimide-, sulfo- containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
- IT Polyethers, uses
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
 (polyketone-, ionomers, sulfo-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
- IT Fuel cells
 (polymer **electrolyte**, new **membranes** for; of polymer **electrolyte membranes** for direct methanol fuel cell)
- IT Sulfonic acids, uses
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
 (polymers, sulfo- group-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
- IT Fluoropolymers, uses
 RL: DEV (Device component use); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
 (polyoxyalkylene-, sulfo-containing, ionomers, benchmark **membranes**; of polymer **electrolyte membranes** for direct methanol fuel cell)
- IT Ionomers
 RL: DEV (Device component use); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
 (polyoxyalkylenes, fluorine- and sulfo-containing, benchmark **membranes**; of polymer **electrolyte membranes** for direct methanol fuel cell)
- IT Polyethers, uses
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
 (polysulfone-, ionomers, sulfo-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
- IT Polyethers, uses
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
 (polysulfone-, phthalazinone group-containing, polyketone-, sulfo-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
- IT Ionic conductivity
 (proton; of polymer **electrolyte membranes** for direct methanol fuel cell)
- IT Doping
 (sulfo- group-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
- IT Sulfonic acids, uses
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES

(Uses)

(sulfo- group-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Ionomers

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(sulfo- group-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Polymers, uses

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(sulfo-containing, sulfo- group-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Ionomers

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(sulfo-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT 67-56-1, Methanol, processes

RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)

(of polymer **electrolyte membranes** for direct methanol fuel cell)

REFERENCE COUNT: 180 THERE ARE 180 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L27 ANSWER 8 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:689857 HCAPLUS

DOCUMENT NUMBER: 145:317869

TITLE: Preparation and properties of sulfonated ETFE-g-polyvinyltoluene membranes for application in fuel cells

AUTHOR(S): Chen, Jinhua; Asano, Masaharu; Yoshida, Masaru; Maekawa, Yasunari

CORPORATE SOURCE: Takasaki Radiation Chemistry Research Institute, Japan Atomic Energy Agency (JAEA), Takasaki, Gunma, 370-1292, Japan

SOURCE: Journal of Applied Polymer Science (2006), 101(4), 2661-2667

CODEN: JAPNAB; ISSN: 0021-8995

PUBLISHER: John Wiley & Sons, Inc.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A new polymer **electrolyte membrane** prepared by radiation grafting of vinyltoluene into poly(ethylene-co-tetrafluoroethylene) (ETFE) film and subsequent sulfonation was developed for application in fuel cells. The effect of grafting condition on the degree of grafting was studied. The degree of grafting can be controlled over a wide range. The grafted films were sulfonated in a chlorosulfonic acid solution to obtain the polymer **electrolyte membranes**, which were characterized with respect to their use in fuel cells. The substituted Me group on the vinyltoluene can improve the chemical stability of the resulting membranes, and the crosslinked ETFE-g-poly(vinyltoluene-co-divinylbenzene) membranes can be proposed for the future development of alternative low-cost and high-performance membranes for fuel cells.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

- Section cross-reference(s): 35, 38
- ST sulfonated ethene tetrafluoroethene vinyltoluene **grafted copolymer** membrane fuel cell; polymer **electrolyte** fuel cell **membrane** radiation crosslinking grafting cond
- IT Vinyl compounds, preparation
 RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation);
 PREP (Preparation); RACT (Reactant or reagent)
 (aryl, **polymers**, fluoropolymers, **graft**,
 sulfonated; preparation and properties of sulfonated
 ETFE-g-polyvinyltoluene membranes for application in fuel cells)
- IT Vinyl compounds, preparation
 RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation);
 PREP (Preparation); RACT (Reactant or reagent)
 (aryl, **polymers**, fluoropolymers, **graft**;
 preparation and properties of sulfonated ETFE-g-polyvinyltoluene
 membranes for application in fuel cells)
- IT **Polymerization**
 (**graft**, photochem., γ -ray- induced, effect on
 polymer electrolyte properties; preparation and properties of
 sulfonated ETFE-g-polyvinyltoluene membranes for application in
 fuel cells)
- IT **Permeability**
 (of membranes to methanol; preparation and properties of sulfonated
 ETFE-g-polyvinyltoluene membranes for application in fuel cells)
- IT Vinyl compounds, preparation
 RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation);
 PREP (Preparation); RACT (Reactant or reagent)
 (**polymers**, aromatic, fluoropolymers, **graft**,
 sulfonated; preparation and properties of sulfonated
 ETFE-g-polyvinyltoluene membranes for application in fuel cells)
- IT Vinyl compounds, preparation
 RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation);
 PREP (Preparation); RACT (Reactant or reagent)
 (**polymers**, aromatic, fluoropolymers, **graft**;
 preparation and properties of sulfonated ETFE-g-polyvinyltoluene
 membranes for application in fuel cells)
- IT **Ionic conductivity**
 (**proton**; preparation and properties of sulfonated
 ETFE-g-polyvinyltoluene membranes for application in fuel cells)
- IT Aromatic compounds
 RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation);
 PREP (Preparation); RACT (Reactant or reagent)
 (vinyl, **polymers**, fluoropolymers, **graft**,
 sulfonated; preparation and properties of sulfonated
 ETFE-g-polyvinyltoluene membranes for application in fuel cells)
- IT Aromatic compounds
 RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation);
 PREP (Preparation); RACT (Reactant or reagent)
 (vinyl, **polymers**, fluoropolymers, **graft**;
 preparation and properties of sulfonated ETFE-g-polyvinyltoluene
 membranes for application in fuel cells)
- IT 197895-58-2DP, Ethylene-tetrafluoroethylene-styrene **graft copolymer**, sulfonated 898820-80-9DP, sulfonated
 908610-48-ODP, sulfonated 908610-49-1DP, sulfonated
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical
 process); PRP (Properties); SPN (Synthetic preparation); PREP
 (Preparation); PROC (Process)
 (preparation and properties of sulfonated ETFE-g-polyvinyltoluene
 membranes for application in fuel cells)
- IT 197895-58-2P, Ethylene-tetrafluoroethylene-styrene **graft**

copolymer 898820-80-9P 908610-48-0P 908610-49-1P
RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation);
PREP (Preparation); RACT (Reactant or reagent)
(preparation and properties of sulfonated ETFE-g-polyvinyltoluene
membranes for application in fuel cells)

REFERENCE COUNT: 29 THERE ARE 29 CITED REFERENCES AVAILABLE
FOR THIS RECORD. ALL CITATIONS AVAILABLE
IN THE RE FORMAT

L27 ANSWER 9 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:606811 HCAPLUS
DOCUMENT NUMBER: 145:274735
TITLE: Composite Gel-Type Proton Membranes
AUTHOR(S): Navarra, M. A.; Fernicola, A.; Panero, S.;
Scrosati, B.
CORPORATE SOURCE: Department of Chemistry, University of Rome "La
Sapienza", Rome, 00185, Italy
SOURCE: Journal of the Electrochemical Society (2006),
153(7), A1284-A1289
CODEN: JESQAN; ISSN: 0013-4651
PUBLISHER: Electrochemical Society
DOCUMENT TYPE: Journal
LANGUAGE: English

AB This paper reviews the properties of a new **microporous**,
composite **proton-conducting** gel membrane, formed
by swelling with aqueous acid solns. suitable polymer matrixes containing
dispersed ceramic fillers. These membranes have a high and stable
conductivity, a **proton** transport intrinsically provided
by the absorbed acid solution not strictly influenced by the external
humidity level, and a projected very low cost. Tests in a
hydrogen-air laboratory cell also demonstrate that the membranes are
basically suitable for application in polymer electrolyte fuel
cells.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST composite gel **proton conducting** membrane
fuel cell polymer **electrolyte**

IT Cation exchange membranes
Fuel cell electrolytes

Permeability
Polymer electrolytes
(composite gel-type proton membranes)

IT **Stability**
(oxidative, of **proton conducting** membranes;
composite gel-type proton membranes)

IT **Ionic conductivity**
(**proton**, of gelled composite membranes and
time-stability of; composite gel-type proton membranes)

IT 906640-04-8DP, Glutaraldehyde-vinyl acetate **graft**
copolymer, hydrolyzed

RL: DEV (Device component use); SPN (Synthetic preparation); TEM
(Technical or engineered material use); PREP (Preparation); USES
(Uses)

(composites with 4-ethylbenzenesulfonyl -modified silica, gels
with sulfuric acid solution; composite gel-type proton membranes)

REFERENCE COUNT: 16 THERE ARE 16 CITED REFERENCES AVAILABLE
FOR THIS RECORD. ALL CITATIONS AVAILABLE
IN THE RE FORMAT

L27 ANSWER 10 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:519079 HCAPLUS
DOCUMENT NUMBER: 145:170629
TITLE: Determination of the physicochemical characteristics and electrical performance of post-sulfonated and grafted sulfonated derivatives of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell
AUTHOR(S): Le Ninivin, C.; Balland-Longeau, A.; Demattei, D.; Palmas, P.; Saillard, J.; Coutanceau, C.; Lamy, C.; Leger, J. M.
CORPORATE SOURCE: Laboratoire de Materiaux Organiques et Dielectriques et de Caracterisations Physico-Chimiques, Commissariat a l'Energie Atomique Le Ripault, Monts, 37260, Fr.
SOURCE: Journal of Applied Polymer Science (2006), 101(2), 944-952
CODEN: JAPNAB; ISSN: 0021-8995
PUBLISHER: John Wiley & Sons, Inc.
DOCUMENT TYPE: Journal
LANGUAGE: English

- AB Poly(para-phenylene)s (PPPs) are an interesting class of rigid-rod polymers that have excellent thermal and mech. properties. Because of their high degree of crystallinity and lower **permeability** to methanol, PPPs are insol. and infusible. A number of methods were developed to synthesize substituted sulfonated PPPs bearing lateral chains to improve their solubility. A comparison of the physicochem. properties of three PPP-based polymers is made with respect to Nafion membranes. One of these polymers was prepared with the post-sulfonation method, and the other two were made with a new method of grafting developed in the Commissariat a l'Energie Atomique laboratory (a **grafted sulfonated PPP polymer** and a **grafted perfluorinated sulfonated polymer**). The sulfonated PPP polymers were examined for their mech. properties, small-angle x-ray scattering, water absorption, **proton conductivity**, and methanol **permeability**. Relations between structures and properties were also studied. Performances in fuel-cell tests were also studied.
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology) Section cross-reference(s): 35, 36, 38
- ST characterization sulfonated grafted polyphenylene **proton conducting** membrane; polymer **electrolyte membrane** fuel cell methanol **permeability** sulfonated polyphenyl
- IT Ion exchange
(capacity for each membrane; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)
- IT Crystallinity
Fuel cell separators
Ion exchange membranes
Permeability
Polyelectrolytes
Thermal stability
(determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

- IT Membranes, nonbiological
(elec. conductive; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)
- IT Polyoxyalkylenes, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(fluorine- and sulfo-containing, ionomers; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)
- IT Open circuit potential
(of assembled fuel cells; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)
- IT Microstructure
(of membranes; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)
- IT Polyphenyls
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); SPN (Synthetic preparation); PREP (Preparation); PROC (Process); USES (Uses)
(plain and sulfonated; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)
- IT Fuel cells
(polymer electrolyte; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)
- IT Fluoropolymers, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)
- IT Ionomers
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)
- IT Electric energy
(power d. of assembled fuel cells; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new

- proton-conducting** membranes for direct methanol fuel cell)
- IT **Ionic conductivity**
(**proton**; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)
- IT Polyimides, uses
RL: PRP (Properties); TEM (Technical or engineered material use);
USES (Uses)
(sulfonated; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)
- IT 7732-18-5, Water, processes
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(absorption; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)
- IT 67-56-1, Methanol, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)
- IT 150385-13-0P, Poly(benzoyl-1,4-phenylene) 154100-93-3DP, Poly[(4-phenoxybenzoyl)-1,4-phenylene], sulfonated 900792-50-9DP, 4''-sulfonated and 4''-(1,1,2,2-tetrafluoro-2-sulfoethoxy) derivs.
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); SPN (Synthetic preparation); PREP (Preparation); PROC (Process); USES (Uses)
(determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)
- IT 66796-30-3, Nafion 117
RL: DEV (Device component use); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)
- IT 77950-55-1, Nafion 115
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)
- IT 163294-14-2, Nafion 112
RL: PRP (Properties); TEM (Technical or engineered material use);
USES (Uses)
(determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting**

membranes for direct methanol fuel cell)

REFERENCE COUNT: 33 THERE ARE 33 CITED REFERENCES AVAILABLE
FOR THIS RECORD. ALL CITATIONS AVAILABLE
IN THE RE FORMAT

L27 ANSWER 11 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:311777 HCAPLUS

DOCUMENT NUMBER: 145:11211

TITLE: Development of fluoropolymer **electrolyte membranes** for fuel cell applications by the γ -ray induced crosslinking and **graft polymerization** methods

AUTHOR(S): Sawada, Shin-ichi; Yamaki, Tetsuya; Asano, Masaharu; Yoshida, Masaru

CORPORATE SOURCE: Japan Atomic Energy Agency, Watanuki, Takasaki, 370-1292, Japan

SOURCE: Kobunshi Ronbunshu (2006), 63(3), 149-159

CODEN: KBRBA3; ISSN: 0386-2186

PUBLISHER: Kobunshi Gakkai

DOCUMENT TYPE: Journal

LANGUAGE: Japanese

AB Fluoropolymer **electrolyte membranes** for direct methanol fuel cells (DMFC) were developed by combining the γ -ray-induced crosslinking with **graft polymn**. Styrene grafting into crosslinked PTFE films and subsequent sulfonation led to the **electrolyte membranes** exhibiting higher **proton conductivity** and lower methanol **permeability** compared to those of Nafion. Such high performances were considered to originate from the low water uptake due to the crosslinking structure. As a second step, two styrene derivative monomers possessing the hydrophobic hydrocarbon groups on the aromatic rings and two different crosslinkers were **graft-copolymerized**. instead of styrene into poly(ethylene-co-tetrafluoroethylene) (ETFE) films, in which radiation crosslinking occurred at room temperature. The sulfonated **electrolyte membranes** were obtained by the γ -ray crosslinking after the four-component grafting, showing six times higher oxidation resistance compared to the conventional styrene-divinylbenzene grafted ones, and methanol **permeability** being ten times lower than that of Nafion. This study revealed the applicability of radiation-processing technol. to the research and development of **electrolyte membranes** for PEFC applications.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST fluoropolymer styrene **graft polymn** sulfonation
fuel cell electrolyte; polymer electrolyte sulfonated fluoropolymer
gamma ray crosslinking; direct methanol fuel cell sulfonated
fluoropolymer electrolyte

IT Fuel cells
(direct methanol; sulfonated crosslinked fluoropolymers as
polymer **electrolyte membranes** for
direct-methanol fuel cells)

IT Sulfonation
(of crosslinked fluoropolymers; sulfonated crosslinked
fluoropolymers as polymer **electrolyte membranes**
for direct-methanol fuel cells)

IT Fuel cell electrolytes
Fuel cell separators
(polymer electrolytes; sulfonated crosslinked fluoropolymers as

- polymer **electrolyte membranes** for direct-methanol fuel cells)
- IT **Ionic conductivity**
(**proton**, of sulfonated crosslinked fluoropolymers; sulfonated crosslinked fluoropolymers as polymer **electrolyte membranes** for direct-methanol fuel cells)
- IT **Crosslinking**
(radiochem., of fluoropolymers; sulfonated crosslinked fluoropolymers as polymer **electrolyte membranes** for direct-methanol fuel cells)
- IT 109211-02-1DP, Styrene-tetrafluoroethylene **graft copolymer**, sulfonated 496068-47-4DP, sulfonated 886532-60-1DP, sulfonated 888319-24-2DP, sulfonated 888319-25-3DP, sulfonated
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(**electrolyte membrane**; sulfonated crosslinked fluoropolymers as polymer **electrolyte membranes** for direct-methanol fuel cells)
- IT 67-56-1, Methanol, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(**permeability** of; sulfonated crosslinked fluoropolymers as polymer **electrolyte membranes** for direct-methanol fuel cells)
- IT 25038-71-5P, Ethylene-tetrafluoroethylene copolymer
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); SPN (Synthetic preparation); PREP (Preparation); PROC (Process)
(synthesis and γ -ray crosslinking of; sulfonated crosslinked fluoropolymers as polymer **electrolyte membranes** for direct-methanol fuel cells)

L27 ANSWER 12 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:258024 HCAPLUS

DOCUMENT NUMBER: 142:484674

TITLE: **Grafted polymer**

electrolyte membrane for direct methanol fuel cells

AUTHOR(S): Shen, M.; Roy, S.; Kuhlmann, J. W.; Scott, K.; Lovell, K.; Horsfall, J. A.

CORPORATE SOURCE: School of Chemical Engineering and Advanced Materials, University of Newcastle upon Tyne, Newcastle upon Tyne, NE1 7RU, UK

SOURCE: Journal of Membrane Science (2005), 251(1-2), 121-130

CODEN: JMESDO; ISSN: 0376-7388

PUBLISHER: Elsevier B.V.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The performance of direct methanol fuel cells (DMFC) with radiation **grafted polymer electrolyte membranes** (PEM) is reported. The membranes used poly ethylene-tetrafluoroethylene (ETFE), poly vinylidene fluoride (PVDF) and low-d. polyethylene (LDPE) as base polymer films. The base polymer films were **grafted** with polystyrene sulfonic acid (PSSA) as **proton-conducting** groups. The effects of varying the degree of grafting (DOG) and the membrane thickness, which change the ion conductivity and methanol

permeability, has a strong influence on methanol crossover of the DMFC and the performance of the DMFC. Typically, increasing the degree of grafting increases the ion conductivity and the methanol crossover. By adjusting the degree of grafting and the membrane thickness, membranes with suitable conductivity and low methanol crossover were produced. The DMFC performance with such membranes was superior to that of with Nafion membrane.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 76

ST methanol fuel cell polystyrene sulfonated **grafted polymer electrolyte membrane**

IT Membranes, nonbiological
(elec. conductive; **grafted polymer electrolyte membrane** for direct methanol fuel cells)

IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(fluorine- and sulfo-containing, ionomers; **grafted polymer electrolyte membrane** for direct methanol fuel cells)

IT **Polymerization**
(**graft**, radiochem.; **grafted polymer electrolyte membrane** for direct methanol fuel cells)

IT **Membrane electrodes**
Permeability
Polymer electrolytes
(**grafted polymer electrolyte membrane** for direct methanol fuel cells)

IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(**grafted polymer electrolyte membrane** for direct methanol fuel cells)

IT Graphitized carbon black
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(**grafted polymer electrolyte membrane** for direct methanol fuel cells)

IT Current density
Electric current-potential relationship
(of assembled fuel cells; **grafted polymer electrolyte membrane** for direct methanol fuel cells)

IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers; **grafted polymer electrolyte membrane** for direct methanol fuel cells)

IT Ionomers
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing; **grafted polymer electrolyte membrane** for direct methanol fuel cells)

IT Electric energy
(power d.; **grafted polymer electrolyte membrane** for direct methanol fuel cells)

IT Fuel cells
(proton exchange membrane; **grafted polymer electrolyte membrane** for

- direct methanol fuel cells)
- IT Ionic conductivity
(proton, degree of grafting effect on;
grafted polymer electrolyte
membrane for direct methanol fuel cells)
- IT Fluoropolymers, uses
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic
preparation); PREP (Preparation); USES (Uses)
(sulfo-containing, vinyl; grafted polymer
electrolyte membrane for direct methanol fuel
cells)
- IT Fluoropolymers, uses
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic
preparation); PREP (Preparation); USES (Uses)
(vinyl, sulfo-containing; grafted polymer
electrolyte membrane for direct methanol fuel
cells)
- IT 106826-12-4DP, Ethylene, styrene graft copolymer
, sulfonated
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic
preparation); PREP (Preparation); USES (Uses)
(LDPE; grafted polymer electrolyte
membrane for direct methanol fuel cells)
- IT 67-56-1, Methanol, uses
RL: CPS (Chemical process); PEP (Physical, engineering or chemical
process); PRP (Properties); PYP (Physical process); TEM (Technical
or engineered material use); PROC (Process); USES (Uses)
(grafted polymer electrolyte
membrane for direct methanol fuel cells)
- IT 7440-06-4, Platinum, uses 7440-18-8, Ruthenium, uses 7440-44-0,
Carbon, uses 9002-84-0, Polytetrafluoroethene
RL: DEV (Device component use); USES (Uses)
(grafted polymer electrolyte
membrane for direct methanol fuel cells)
- IT 109955-91-1DP, Vinylidene fluoride, styrene graft
copolymer, sulfonated 197895-58-2DP, Ethylene,
tetrafluoroethylene, styrene graft copolymer,
sulfonated
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic
preparation); PREP (Preparation); USES (Uses)
(grafted polymer electrolyte
membrane for direct methanol fuel cells)
- IT 66796-30-3, Nafion 117
RL: DEV (Device component use); PRP (Properties); TEM (Technical or
engineered material use); USES (Uses)
(grafted polymer electrolyte
membrane for direct methanol fuel cells)
- IT 7782-42-5, Graphite, uses
RL: DEV (Device component use); TEM (Technical or engineered
material use); USES (Uses)
(grafted polymer electrolyte
membrane for direct methanol fuel cells)
- IT 322012-68-0, TGP-H 090
RL: DEV (Device component use); TEM (Technical or engineered
material use); USES (Uses)
(paper; grafted polymer electrolyte
membrane for direct methanol fuel cells)

REFERENCE COUNT: 18 THERE ARE 18 CITED REFERENCES AVAILABLE
FOR THIS RECORD. ALL CITATIONS AVAILABLE
IN THE RE FORMAT

L27 ANSWER 13 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2004:494070 HCAPLUS

DOCUMENT NUMBER: 141:26204

TITLE: Fuel cell incorporating a polymer electrolyte membrane grafted by irradiation

INVENTOR(S): Dubitsky, Yuri A.; Lopes Correia Tavares, Ana Berta; Zaopo, Antonio; Albizzati, Enrico

PATENT ASSIGNEE(S): Italy

SOURCE: PCT Int. Appl., 33 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 2

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2004051782	A1	20040617	WO 2002-EP7166	20020628
W: US CA 2489558	AA	20040108	CA 2003-2489558	20030623
WO 2004004053	A2	20040108	WO 2003-EP6580	20030623
WO 2004004053	A3	20040325		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
AU 2003280479	A1	20040119	AU 2003-280479	20030623
EP 1518289	A2	20050330	EP 2003-740308	20030623
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
JP 2005531891	T2	20051020	JP 2004-516639	20030623
NO 2005000373	A	20050124	NO 2005-373	20050124
US 2006166046	A1	20060727	US 2005-518467	20050720

PRIORITY APPLN. INFO.:

WO 2002-EP7166

A

200206
28

WO 2003-EP6580

W

200306
23

- AB The invention concerns a fuel cell comprising: (a) an anode; (b) a cathode; (c) a polymer **electrolyte membrane** placed between the anode and the cathode which comprises at least one polyolefin grafted with side chains containing **proton conductive** functional groups; wherein the fuel cell has: a value of cell resistance at 90° not higher than 0.30 Ω -cm²; preferably comprised between 0.02 Ω -cm² and 0.25 Ω -cm²; more preferably comprised between 0.05 Ω -cm² and 0.20 Ω -cm²; a value of cell resistance at 20° differing from the value of cell resistance at 90° of an amount not higher than 90%, preferably not higher than 70%, more preferably not higher than 50%, with respect to the value of cell resistance at 90°. Preferably, the fuel cell is a direct methanol fuel cell.
- IC ICM H01M008-10
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
- ST fuel cell **polymer electrolyte membrane**
irradn grafted
- IT Ion exchange
(capacity; fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT Hydrocarbons, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(cyclic, solvent; fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT Decomposition catalysts
Fuel cell electrolytes
Gamma ray
Sulfonation
Vehicles
(fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT **Polymerization**
(graft; fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT Fluoropolymers, uses
Polyolefins
RL: DEV (Device component use); USES (Uses)
(grafted with side chains containing **proton conductive** functional groups; fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT Cyclic compounds
RL: TEM (Technical or engineered material use); USES (Uses)
(hydrocarbons, solvent; fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT **Permeation**

- (methanol; fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT Fuel cells
(polymer electrolyte, direct methanol; fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT Electric apparatus
(portable; fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT Alcohols, uses
Aromatic hydrocarbons, uses
Esters, uses
Ethers, uses
Ketones, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(solvent; fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT 1344-67-8, Copper chloride 7646-79-9, Cobaltous chloride, uses
7720-78-7, Ferrous sulfate 10025-73-7, Chromic chloride
10045-89-3, Ferrous ammonium sulfate
RL: CAT (Catalyst use); USES (Uses)
(fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT 7664-93-9, Sulfuric acid, processes 7789-21-1, Fluorosulfonic acid
7790-94-5, Chlorosulfonic acid 13537-32-1, Fluorophosphoric acid
13779-42-5, Chlorophosphoric acid
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT 9002-85-1D, Polyvinylidene chloride, grafted with side chains containing **proton conductive functional groups** 9002-86-2D, Polyvinyl chloride, grafted with side chains containing **proton conductive functional groups** 9002-88-4D, Polyethylene, grafted with side chains containing **proton conductive functional groups** 9003-07-0D, Polypropylene, grafted with side chains containing **proton conductive functional groups** 9010-79-1D, Ethylene-propylene copolymer, grafted with side chains containing **proton conductive functional groups** 9011-17-0D, Hexafluoropropylene-vinylidene fluoride copolymer, grafted with side chains containing **proton conductive functional groups** 24937-78-8D, Ethylene vinyl acetate copolymer, grafted with side chains containing **proton conductive functional groups** 24937-79-9D, Polyvinylidene fluoride, grafted with side chains containing **proton conductive functional groups** 24981-14-4D, Polyvinyl fluoride, grafted with side chains containing **proton conductive functional groups** 25038-71-5D, Ethylene-tetrafluoroethylene copolymer, grafted with side chains containing **proton conductive functional groups** 25101-39-7D, Chlorotrifluoroethylene-propylene copolymer, grafted with side chains containing **proton conductive functional groups** 25101-45-5D, Chlorotrifluoroethylene-ethylene copolymer, grafted with side chains containing **proton conductive functional groups** 25684-76-8D,

Tetrafluoroethylene-vinylidene fluoride copolymer,
grafted with side chains containing proton
conductive functional groups 25750-84-9D, Ethylene butyl
acrylate copolymer, grafted with side
chains containing proton conductive functional
groups

RL: DEV (Device component use); USES (Uses)
(fuel cell incorporating polymer electrolyte
membrane grafted by irradiation)

IT 106826-12-4DP, Ethylene-styrene graft copolymer,
sulfonated

RL: DEV (Device component use); SPN (Synthetic preparation); PREP
(Preparation); USES (Uses)

(fuel cell incorporating polymer electrolyte
membrane grafted by irradiation)

IT 67-56-1, Methanol, uses 1333-74-0, Hydrogen, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(fuel cell incorporating polymer electrolyte
membrane grafted by irradiation)

REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR
THIS RECORD. ALL CITATIONS AVAILABLE IN
THE RE FORMAT

L27 ANSWER 14 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2004:21068 HCAPLUS

DOCUMENT NUMBER: 140:79803

TITLE: Fuel cell incorporating a polymer
electrolyte membrane
grafted by irradiation

INVENTOR(S): Dubitsky, Yuri A.; Lopes Correia Tavares, Ana
Berta; Zaopo, Antonio; Albizzati, Enrico

PATENT ASSIGNEE(S): Pirelli & C. S.P.A., Italy

SOURCE: PCT Int. Appl., 31 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 2

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2004004053	A2	20040108	WO 2003-EP6580	20030623
WO 2004004053	A3	20040325		
W:				
AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW				
RW:				
GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
WO 2004051782	A1	20040617	WO 2002-EP7166	20020628

W: US
CA 2489558 AA 20040108 CA 2003-2489558 200306
23
AU 2003280479 A1 20040119 AU 2003-280479 200306
23
EP 1518289 A2 20050330 EP 2003-740308 200306
23
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,
PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU,
SK
JP 2005531891 T2 20051020 JP 2004-516639 200306
23
NO 2005000373 A 20050124 NO 2005-373 200501
24
US 2006166046 A1 20060727 US 2005-518467 200507
20
PRIORITY APPLN. INFO.: WO 2002-EP7166 A 200206
28
WO 2003-EP6580 W 200306
23

AB The invention concerns a fuel cell comprising: (a) an anode; (b) a
cathode; (c) a polymer **electrolyte membrane**
placed between the anode and the cathode which comprises at least
one polyolefin grafted with side chains containing **proton**
conductive functional groups; wherein the fuel cell has: a
value of cell resistance at 90° not higher than 0.30
Ω-cm², preferably comprised between 0.2 and 0.25 Ω-cm²,
more preferably comprised between 0.05 and 0.20 Ω-cm²; a value
of cell resistance at 20° differing from the value of cell
resistance at 90° of an amount not higher than 90%, preferably
not higher than 70%, more preferably not higher than 50%, with
respect to the value of cell resistance at 90°. Preferably,
the fuel cell is a direct methanol fuel cell.

IC ICM H01M008-10
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST fuel cell **polymer electrolyte membrane**
irradn **grafted**; methanol direct fuel cell
IT **Permeation**
(MeOH; fuel cell incorporating **polymer**
electrolyte membrane grafted by
irradiation)
IT Sulfonation
(agents; fuel cell incorporating **polymer**
electrolyte membrane grafted by
irradiation)
IT Hydrocarbons, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(cyclic, solvent; fuel cell incorporating **polymer**
electrolyte membrane grafted by

- irradiation)
- IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(fluorine- and sulfo-containing, ionomers; fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT Decomposition catalysts
Electric vehicles
Fuel cell electrolytes
(fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT Cyclic compounds
RL: TEM (Technical or engineered material use); USES (Uses)
(hydrocarbons, solvent; fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT Gamma ray
Plasma
UV radiation
X-ray
(irradiation; fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers; fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT Ionomers
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing; fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT EPDM rubber
Fluoropolymers, uses
Polyolefins
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(**proton-conductive functional group-containing side chain-grafted; fuel cell incorporating polymer electrolyte membrane grafted by irradiation**)
- IT Fuel cells
(solid **electrolyte, polymer electrolyte membrane**, direct methanol; fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT Alcohols, uses
Aromatic hydrocarbons, uses
Esters, uses
Ethers, uses
Ketones, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(solvent; fuel cell incorporating **polymer electrolyte membrane grafted by irradiation**)
- IT Hydrocarbons, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(unsatd.; fuel cell incorporating **polymer**)

- electrolyte membrane grafted by irradiation)**
- IT Sulfonic acids, processes
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(vinylalkyl; fuel cell incorporating polymer electrolyte membrane grafted by irradiation)
- IT 1344-67-8, Copper chloride 7720-78-7, Ferrous sulfate
 10025-73-7, Chromic chloride 10045-89-3, Ferrous ammonium sulfate
 10241-04-0, Cobaltic chloride
 RL: CAT (Catalyst use); USES (Uses)
(fuel cell incorporating polymer electrolyte membrane grafted by irradiation)
- IT 79-10-7, Acrylic acid, processes 79-41-4, Methacrylic acid, processes 98-83-9, α -Methylstyrene, processes 100-42-5, Styrene, processes 100-42-5D, Styrene, chloroalkyl derivative 100-80-1, m-Methylstyrene 101-37-1, Triallyl cyanurate 611-15-4, O-Methylstyrene 622-97-9, p-Methylstyrene 696-31-1, α -Fluorostyrene 769-57-3, α,β,β -Trimethylstyrene 1321-74-0, Divinylbenzene, processes 1337-81-1, Vinylpyridine 1592-20-7, p-Chloromethylstyrene 2082-61-3, α,β -Dimethylstyrene 7664-93-9, Sulfuric acid, processes 7789-21-1, Fluorosulfonic acid 7790-94-5, Chlorosulfonic acid 13537-32-1, Fluorophosphoric acid 13779-42-5, Chlorophosphoric acid 90622-00-7, Benzene, ethenyl-, trifluoro derivative
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(fuel cell incorporating polymer electrolyte membrane grafted by irradiation)
- IT 66796-30-3, Nafion 117 163294-14-2, Nafion 112
 RL: DEV (Device component use); USES (Uses)
(fuel cell incorporating polymer electrolyte membrane grafted by irradiation)
- IT 67-56-1, Methanol, uses 1333-74-0, Hydrogen, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
(fuel cell incorporating polymer electrolyte membrane grafted by irradiation)
- IT 12587-47-2, Beta particle
 RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(irradiation; fuel cell incorporating polymer electrolyte membrane grafted by irradiation)
- IT 9002-85-1, Polyvinylidene chloride 9002-86-2, Polyvinyl chloride 9002-88-4, Polyethylene 9003-07-0, Polypropylene 9010-79-1, Ethylene-propylene copolymer 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 24937-78-8, Ethylene-vinyl acetate copolymer 24937-79-9, PvdF 24981-14-4, Polyvinyl fluoride 25101-39-7, Chlorotrifluoroethylene-propylene copolymer 25684-76-8, Tetrafluoroethylene-vinylidene fluoride copolymer 25750-84-9, Butyl acrylate-ethylene copolymer 26160-99-6, Ethylene-Hexafluoropropylene copolymer 52991-93-2, Hexafluoropropylene-propylene copolymer
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(proton-conductive functional group-containing side chain-grafted; fuel cell incorporating polymer electrolyte membrane grafted by irradiation)

L27 ANSWER 15 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2002:226084 HCAPLUS

DOCUMENT NUMBER: 136:376279

TITLE: Electrochemical characterization of radiation-grafted ion-exchange membranes based on different matrix polymers

AUTHOR(S): Kallio, Tanja; Lundstrom, Matts; Sundholm, Goran; Walsby, Nadia; Sundholm, Franciska

CORPORATE SOURCE: Laboratory of Physical Chemistry and Electrochemistry, Helsinki University of Technology, FIN-02015, Finland

SOURCE: Journal of Applied Electrochemistry (2002), 32(1), 11-18

CODEN: JAELEBJ; ISSN: 0021-891X

PUBLISHER: Kluwer Academic Publishers

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Seven **proton conducting** membranes based on different com. fluoropolymer films were prepared by radiation grafting with styrene followed by sulfonation. These membranes were studied as candidates for fuel cell **electrolyte membranes** and compared to Nafion 105 and 117 with respect to **conductivity**, oxygen and **hydrogen permeability**, kinetics of the oxygen reduction reaction (ORR) and performance in a fuel cell. The dependence of the conductivity of the membranes on the relative humidity (RH) and temperature was also determined. The conductivity was observed to depend on the

membrane thickness and the water uptake. The dependence of the conductivity on the temperature and the RH was the same for all of the exptl. membranes. Reactant gas **permeabilities** appeared to depend only slightly on the matrix material and no major differences in the Tafel slopes and exchange current densities of the ORR were observed. Membranes with high water uptakes appeared to be less durable in the fuel cell than membranes with low water uptakes. Thus to prepare a membrane that is durable under the fuel cell conditions, the water uptake must remain low even at the expense of the conductivity

CC 72-3 (Electrochemistry)

Section cross-reference(s): 36, 38, 52

IT **Permeability**

(gas; of radiation-grafted ion-exchange membranes based on different matrix polymers)

IT **Polymer electrolytes**

(radiation-grafted ion-exchange membranes based on different matrix polymers)

IT 7782-44-7, Oxygen, properties

RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)

(**permeability** and reduction on radiation-grafted ion-exchange membranes based on different matrix polymers)

IT 1333-74-0, Hydrogen, properties

RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)

(**permeability** through radiation-grafted ion-exchange membranes based on different matrix polymers)

REFERENCE COUNT: 30 THERE ARE 30 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L27 ANSWER 16 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2000:847094 HCAPLUS
DOCUMENT NUMBER: 134:103156
TITLE: Electrochemical characterization of
ethylenetetrafluoroethylene-g-
polystyrenesulfonic acid solid polymer
electrolytes
AUTHOR(S): Chuv, Carmen; Basura, Vesna I.; Simon, Evelyne;
Holdcroft, Steven; Horsfall, Jackie; Lovell,
Keith V.
CORPORATE SOURCE: Department of Chemistry, Simon Fraser
University, Burnaby, BC, V5A 1S6, Can.
SOURCE: Journal of the Electrochemical Society (2000),
147(12), 4453-4458
CODEN: JESOAN; ISSN: 0013-4651
PUBLISHER: Electrochemical Society
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Electrochem. characterization of a series of membranes based on
polystyrenesulfonic acid grafted onto ethylenete-trafluoroethylene
(ETFE-g-PSSA) was determined by chronoamperometry with a microdisk
electrode using a solid-state electrochem. cell at 100% relative
humidity and over a range of temps. The oxygen diffusion coefficient and
permeability increased with decreasing equivalent weight (EW).
Oxygen solubility marginally decreased. These observations can be
explained on the basis of increasing water content with decreasing
EW. **Proton conductivity** also increased with water
content and does not directly correlate with proton concentration within
the membrane.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 72

ST proton exchange **membrane** fuel cell **electrolyte**;
ethylene tetrafluoroethylene styrenesulfonate **graft**
polymer electrolyte

IT Diffusion
Permeability
(of oxygen; electrochem. characterization of ethylene-
tetrafluoroethylene-g-polystyrenesulfonic acid solid polymer
electrolytes)

IT **Ionic conductivity**
(**proton**; electrochem. characterization of
ethylene-tetrafluoroethylene-g-polystyrenesulfonic acid solid
polymer electrolytes)

REFERENCE COUNT: 24 THERE ARE 24 CITED REFERENCES AVAILABLE
FOR THIS RECORD. ALL CITATIONS AVAILABLE
IN THE RE FORMAT

=> d 139 ibib abs hitstr hitind 1-7

L39 ANSWER 1 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:542640 HCAPLUS
DOCUMENT NUMBER: 145:48526
TITLE: **Electrolyte membrane**, its
manufacture, and solid **polymer** fuel
cell using the membrane
INVENTOR(S): Yamamoto, Kazushige; Emori, Hideyuki; Abe,
Masao; Sho, Kinkou
PATENT ASSIGNEE(S): Nitto Denko Corp., Japan

SOURCE: PCT Int. Appl., 29 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2006059582	A1	20060608	WO 2005-JP21831	20051129
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
JP 2006216531	A2	20060817	JP 2005-341633	20051128
PRIORITY APPLN. INFO.:				
			JP 2004-351572	A
				20041203
			JP 2005-2352	A
				20050107

AB Disclosed is an **electrolyte membrane** which enables a fuel cell to have a high maximum output when used therein since it has high **proton conductivity** and high **hydrogen gas impermeability**. The **electrolyte membrane** is manufactured by impregnating a porous substrate with a solution containing a sulfonate group-containing vinyl **monomer** and **polymerizing the monomer**; where vinyl **monomer** contains ≥ 80 mol% of a vinyl sulfonate having purity $\geq 90\%$ and/or its salt; and the concentration of the vinyl sulfonate and/or its salt in the solution is ≥ 35 weight%. The **electrolyte membrane** has a **H⁺-conductive polymer**, comprising the above required sulfonate group-containing vinyl **monomer** and **filled** in pores of the **porous substrate**. The fuel cell uses the above **electrolyte membrane**.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel cell **electrolyte membrane** sulfonate group contg vinyl **polymer**

IT Polyolefin rubber

RL: DEV (Device component use); USES (Uses)
 (ethene-norbornene **copolymers**; structure and manufacture **electrolyte membranes** having sulfonate group-containing vinyl **polymers** for fuel cells)

IT Fuel cell electrolytes

Fuel cells

(structure and manufacture **electrolyte membranes**
having sulfonate group-containing vinyl **polymers** for fuel
cells)

IT 74-85-1D, Ethene, **polymers** with norbornene and olefins
498-66-8D, Norbornene, **polymers** with ethene and olefins
705281-77-2

RL: DEV (Device component use); USES (Uses)
(structure and manufacture **electrolyte membranes**
having sulfonate group-containing vinyl **polymers** for fuel
cells)

REFERENCE COUNT: 13 THERE ARE 13 CITED REFERENCES AVAILABLE
FOR THIS RECORD. ALL CITATIONS AVAILABLE
IN THE RE FORMAT

L39 ANSWER 2 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:465103 HCAPLUS

DOCUMENT NUMBER: 144:491849

TITLE: **Electrolyte membrane** for
fuel cell and its manufacture

INVENTOR(S): Nakazawa, Akira; Takeda, Shinji; Ueshima,
Koichi; Sasaki, Shoichi; Fukuchi, Iwao; Oda,
Akihiro; Zhou, Hua; Yamaguchi, Takehisa
PATENT ASSIGNEE(S): Hitachi Chemical Co., Ltd., Japan; Tokyo
University

SOURCE: Jpn. Kokai Tokkyo Koho, 19 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2006128066	A2	20060518	JP 2005-154441	200505 26
US 2006275637	A1	20061207	US 2006-440356	200605 25
PRIORITY APPLN. INFO.:			JP 2004-287802	A 200409 30
			JP 2005-154441	A 200505 26
			US 2005-739423P	P 200511 25

AB The **electrolyte membrane** contains a porous
substrate having a plurality of pores, and a H+-
conductive polymer composition in the pores; where the
polymer composition comprises a proton acid group-containing aromatic
hydrocarbon **resin**. The **electrolyte**
membrane is manufactured by holding a **monomer** and/or an
oligomer for forming the H+-**conductive**

polymer composition in the pores and **polymerizing** the **monomer** and/or the oligomer.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel cell **electrolyte membrane** manuf
proton conductive polymer

IT Fuel cell electrolytes
(structure and manufacture of **electrolyte membranes**
containing **H+-conductive polymer**
filled porous substrates for fuel
cells)

IT Polyimides, uses
RL: DEV (Device component use); USES (Uses)
(structure and manufacture of **electrolyte membranes**
containing **H+-conductive polymer**
filled porous substrates for fuel
cells)

IT 25667-42-9P, Polyether sulfone 866552-08-1P 887132-71-0P
RL: DEV (Device component use); IMF (Industrial manufacture); PREP
(Preparation); USES (Uses)
(structure and manufacture of **electrolyte membranes**
containing **H+-conductive polymer**
filled porous substrates for fuel
cells)

L39 ANSWER 3 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:1049268 HCAPLUS

DOCUMENT NUMBER: 143:309188

TITLE: **Polymer electrolyte membranes** including porous supports,
method for their evaluation, and fuel cells
Hiraoka, Hideki; Kubota, Kozo; Yamaguchi, Takeo
INVENTOR(S):
PATENT ASSIGNEE(S): Toa Gosei Chemical Industry Co., Ltd., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 15 pp.
CODEN: JKXXAF

DOCUMENT TYPE: Patent
LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2005268032	A2	20050929	JP 2004-78556	200403 18
PRIORITY APPLN. INFO.:			JP 2004-78556	200403 18

AB The membrane comprises a porous support, e.g. (crosslinked) polyolefins, having its pores filled with electrolyte **polymers** and equipped with electrolyte **polymer** layers of $\leq 5 \mu\text{m}$ on its surfaces. The membranes may be manufactured by (1) impregnation of a porous support with a solution or a dispersion containing electrolyte **monomers** or **monomeric precursors** for electrolyte **polymers**, (2) sandwiching the support with a pair of films, (3) removal of the solution or the dispersion in between the film and the support until the distance between the film and the support is $\leq 5 \mu\text{m}$, and (4) **polymerization** of the **monomers**. The membranes

may also be manufactured by preparation of a **porous substrate** having its pores **filled** with electrolyte **polymers** followed by contacting the support surface with a solution of an electrolyte **polymer** different from that in the pores and removing the solvents. The membranes are evaluated by comparing the **proton conductivity** of the membrane under presence of surface water or electrolyte solution and under absence of those. Fuel cells including the membranes are also claimed. The membranes are especially suitable for use in direct alc. fuel cells.

- IC ICM H01M008-02
ICS H01B001-06; H01M008-10
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
- ST direct alc fuel cell **electrolyte membrane**;
polyolefin porous support electrolyte **polymer** impregnated;
porous support **electrolyte polymer** impregnated
membrane
- IT Polyolefins
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
((crosslinked), porous support; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)
- IT Polyesters, uses
RL: NUU (Other use, unclassified); USES (Uses)
(film; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)
- IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(fluorine- and sulfo-containing, ionomers; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)
- IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)
- IT Ionomers
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)
- IT Fuel cell electrolytes
Fuel cells
Polyelectrolytes
Porous materials
(porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)
- IT Ionic conductivity
(**proton**; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)

- IT 9002-88-4, Polyethylene
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
 (crosslinked, porous support; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)
- IT 69824-22-2P, 2-Acrylamido-2-methyl propanesulfonic acid-N,N'-methylenebisacrylamide **copolymer**
 RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (electrolyte; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)
- IT 25038-59-9, uses
 RL: NUU (Other use, unclassified); USES (Uses)
 (film; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)

L39 ANSWER 4 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:823986 HCAPLUS

DOCUMENT NUMBER: 143:232674

TITLE: **Electrolyte membrane, its**
 manufacture, and fuel cell using the membrane
 INVENTOR(S): Kubota, Kouzou; Hiraoka, Hideki; Yamaguchi, Takeo

PATENT ASSIGNEE(S): Toagosei Co., Ltd., Japan

SOURCE: PCT Int. Appl., 23 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2005076396	A1	20050818	WO 2005-JP1372	20050201

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

PRIORITY APPLN. INFO.: JP 2004-26650

A

20040203

AB The **electrolyte membrane** has a **H⁺ conducting polymer electrolyte filled in a porous substrate**, where the substrate is non-swellable by water or organic solvents containing MeOH, and the **electrolyte membrane** has a swelling ratio $[(A-B)/(B-C)]$, A, B, and C are the mass of the swollen membrane, the dry membrane, and the substrate, resp.] 0.1-2.0 after a 1 h immersion in water at 25°. The **electrolyte membrane** is prepared by **polymerizing the monomer of the polymer electrolyte filled in the substrate**.

IC ICM H01M008-02

ICS H01M008-10; H01B001-06

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel cell water methanol nonswellable **polymer electrolyte membrane**

IT Fuel cell electrolytes

(structure and manufacture of nonswelling **electrolyte membranes** for direct methanol fuel cells)

IT 9002-88-4, Polyethylene

RL: DEV (Device component use); USES (Uses)

(crosslinked; structure and manufacture of nonswelling **electrolyte membranes** for direct methanol fuel cells)

IT 69824-22-2 84042-88-6

RL: DEV (Device component use); USES (Uses)

(structure and manufacture of nonswelling **electrolyte membranes** for direct methanol fuel cells)

REFERENCE COUNT: 10 THERE ARE 10 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L39 ANSWER 5 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2004:412213 HCAPLUS

DOCUMENT NUMBER: 140:409645

TITLE: **Electrolyte membranes** with good durability and low methanol permeability for fuel cells

INVENTOR(S): Hiraoka, Hideki; Yamaguchi, Takehisa

PATENT ASSIGNEE(S): Toa Gosei Chemical Industry Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 9 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2004146279	A2	20040520	JP 2002-311929	20021025
PRIORITY APPLN. INFO.:				20021025

AB The **electrolyte membranes**, useful for direct methanol fuel cells, showing rate of increase in area after immersion in water at 25° for 1 h $\leq 20\%$, comprise

porous substrates filled with
 proton-conducting crosslinked polymers
 prepared from protonic acid-containing monomers or their salts
 and crosslinking agents satisfying ratios of mol number of the
 monomers to number of mol number of the crosslinking agents
 multiplied by average functional number per a crosslinking agent 50:(2-50).

- IC ICM H01M008-02
 ICS H01B001-06; H01M008-10
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38
- ST direct methanol fuel cell polymer electrolyte
 membrane; acrylamidemethylpropanesulfonic acid
 methylenebisacrylamide polymer porous polyethylene
 electrolyte
- IT Polyimides, uses
 Polyolefins
 RL: DEV (Device component use); USES (Uses)
 (crosslinked, porous electrolyte substrate;
 electrolyte membranes with good durability and
 low methanol permeability for fuel cells)
- IT Fuel cell electrolytes
 Fuel cells
 Polymer electrolytes
 (electrolyte membranes with good durability
 and low methanol permeability for fuel cells)
- IT Ionic conductors
 (protonic; electrolyte membranes
 with good durability and low methanol permeability for fuel
 cells)
- IT 69824-22-2P, 2-Acrylamido-2-methylpropanesulfonic
 acid-N,N'-methylenebisacrylamide copolymer 689231-96-7P
 RL: DEV (Device component use); IMF (Industrial manufacture); PREP
 (Preparation); USES (Uses)
 (electrolyte membranes with good durability
 and low methanol permeability for fuel cells)
- IT 9002-88-4, Polyethylene
 RL: DEV (Device component use); USES (Uses)
 (porous electrolyte substrate; electrolyte
 membranes with good durability and low methanol
 permeability for fuel cells)

L39 ANSWER 6 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN
 ACCESSION NUMBER: 2002:216370 HCAPLUS
 DOCUMENT NUMBER: 136:265786
 TITLE: Proton-conducting membrane
 or film, its manufacture, and fuel cell using it
 INVENTOR(S): Fujita, Shigeru; Abe, Masao
 PATENT ASSIGNEE(S): Nitto Denko Corp., Japan
 SOURCE: Jpn. Kokai Tokkyo Koho, 10 pp.
 CODEN: JKXXAF
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2002083514	A2	20020322	JP 2000-275015	200009

PRIORITY APPLN. INFO.:

JP 2000-275015

06

200009

06

- AB The **proton-conducting** membrane comprises a **porous** membrane filled with a **polymer** having a phosphate-, phosphonate-, or phosphinate group at side chain in pores. A **proton-conducting** film consists of the above membrane, where a part of voids in the pores are closed. The membrane is manufactured by impregnating a **monomer** having a phosphate-, phosphonate-, or phosphinate side chain in a porous membrane and then **polymerizing** in the pores. The film is manufactured from the membrane by closing the pores. Also claimed is a fuel cell equipped with the membrane or the film as a proton-exchange membrane. The membrane and the film have high durability and strength.
- IC ICM H01B001-06
ICS C08F002-00; C08J009-36; C08J009-40; H01B013-00; H01M008-02; H01M008-10; C08L023-02; C08L027-12
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 76
- ST **proton conducting polymer** membrane
film phosphate phosphonate phosphinate group; fuel cell
proton conducting polymer membrane
- IT Fluoropolymers, uses
Polyolefins
RL: DEV (Device component use); USES (Uses)
(porous substrates; **proton-conducting** membrane or film containing **polymer** having phosphate-, phosphonate-, or phosphinate side chain for fuel cell)
- IT Films
Fuel cell **electrolytes**
Ionic **conductors**
Membranes, nonbiological
(**proton-conducting membrane** or film containing **polymer** having phosphate-, phosphonate-, or phosphinate side chain for fuel cell)
- IT Fuel cells
(solid **electrolyte**; **proton-conducting membrane** or film containing **polymer** having phosphate-, phosphonate-, or phosphinate side chain for fuel cell)
- IT 9002-88-4, Polyethylene
RL: DEV (Device component use); USES (Uses)
(UHMWPE, porous substrate; **proton-conducting** membrane or film containing **polymer** having phosphate-, phosphonate-, or phosphinate side chain for fuel cell)
- IT 51131-63-6P, Light Ester P 1M **homopolymer** 103719-23-9P, Butyl acrylate-Light Ester P 1M **copolymer**
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(**proton-conducting** membrane or film containing **polymer** having phosphate-, phosphonate-, or phosphinate side chain for fuel cell)

L39 ANSWER 7 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2000:646292 HCAPLUS
DOCUMENT NUMBER: 133:225582
TITLE: Electrolyte membranes for

Current application

fuel cells, their manufacture, fuel cells, and
 manufacture of the fuel cells
 INVENTOR(S): Yamaguchi, Takeo; Nakao, Shinichi
 PATENT ASSIGNEE(S): Center for Advanced Science and Technology
 Incubation, Ltd., Japan
 SOURCE: PCT Int. Appl., 20 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2000054351	A1	20000914	WO 2000-JP1370	20000307
W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
AU 2000028310	A5	20000928	AU 2000-28310	20000307
EP 1202365	A1	20020502	EP 2000-906746	20000307
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL				
PRIORITY APPLN. INFO.:			JP 1999-60817	A 19990308
			WO 2000-JP1370	W 20000307

AB The electrolyte membranes have a proton
 conductive polymer filled in the pores
 fo a porous substrate not swellable by MeOH or H2O. The
 substrate is an inorg. material or a heat
 resistant polymer. The membranes are prepared by
 irradiating the porous substrate with an energy beam and contacting
 the substrate with a monomer to form the polymer
 . The fuel cells have the electrolyte membrane
 formed on the catalyst layers of their cathodes or anodes, and are
 prepared by applying sol on an electrode, converting the sol layer to
 a porous substrate film, filling the
 pores in the film with the proton conductive
 polymer, and laminating with the other electrode.

IC ICM H01M008-02
 ICS H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel cell proton conductive polymer

electrolyte; **polymer** electrolyte porous substrate fuel cell

IT Plasma
(argon plasma in manufacture of **polymer** electrolyte **membranes** containing **heat resistant** porous substrates for fuel cells)

IT Fuel cell electrolytes
(manufacture of **polymer** electrolyte **membranes** containing **heat resistant** porous substrates for fuel cells)

IT Fluoropolymers, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(manufacture of **polymer** electrolyte **membranes** containing **heat resistant** porous substrates for fuel cells)

IT 9002-84-0, Teflon 9003-01-4, Polyacrylic acid
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(manufacture of **polymer** electrolyte **membranes** containing **heat resistant** porous substrates for fuel cells)

IT 7440-37-1, Argon, uses
RL: NUU (Other use, unclassified); USES (Uses)
(manufacture of **polymer** electrolyte **membranes** containing **heat resistant** porous substrates for fuel cells)

REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

=> d l46 ibib abs hitstr hitind 1-10

L46 ANSWER 1 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:655697 HCAPLUS

DOCUMENT NUMBER: 145:127562

TITLE: Proton-conductive **electrolyte membranes, electrolytes, and electrolyte solutions, their polymer solution dispersions, and membrane-electrode assembly (MEA) of polymer-electrolyte fuel cells**

INVENTOR(S): Nakazawa, Akira; Oda, Akihiro; Ueshima, Koichi; Susa, Kenzo; Takeda, Shinji; Yamaguchi, Takehisa

PATENT ASSIGNEE(S): Hitachi Chemical Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 25 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006179448	A2	20060706	JP 2005-98783	20050330

PRIORITY APPLN. INFO.:

JP 2004-103287

A

200403
31

JP 2004-341795

A

200411
26

- AB Electrolyte membranes** contain protonic acid-bearing organic materials, and inorg. materials. The inorg. materials may be OH-group-bearing compds. prepared by sol-gel processing, and may have particle diameter of 0.5-100 nm. The inorg. materials are dispersed in solvents or polymer solns. to give electrolyte solns. The solvents are removed from the electrolyte solns. to give **electrolyte membranes**. The polymer-electrolyte dispersion solns. are filled in continuous pores of porous membranes, then the solvents are removed to give **electrolyte membranes**. In manufacture of proton-conductive **electrolyte membranes**, chelating agents are added in sol-gel preparation of the inorg. materials for forming complexes with 0.5-100 nm diameter. Also claimed are the MEA formed by using the membranes above claimed. The membranes show high water contents even in high-temperature and low-humid environment.
- CC** 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 76
- ST fuel cell protonic acid polymer electrolyte composite inorg; sol gel inorg hydroxide composite polymer fuel cell electrolyte; membrane electrolyte proton conductive polymer fuel cell**
- IT Fuel cell electrolytes**
Polyelectrolytes
(fuel cell) **electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)
- IT Polysulfones, uses**
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polyether-, sulfo-containing, proton-conductive **electrolyte membranes; (fuel cell) electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)
- IT Silsesquioxanes**
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polyether-polysulfone-, polysulfone polyether siloxane silsesquioxanes, sulfo-containing, proton-conductive **electrolyte membranes; (fuel cell) electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)
- IT Silsesquioxanes**
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polyether-polysulfone-, titanoxanes, proton-conductive

- electrolyte membranes; (fuel cell) electrolyte membrane containing protonic-acid-bearing polymer and (OH-group-containing) inorg. compound)**
- IT Polysulfones, uses
 RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (polyether-silsesquioxane-, polysulfone polyether siloxane silsesquioxanes, sulfo-containing, proton-conductive **electrolyte membranes; (fuel cell) electrolyte membrane containing protonic-acid-bearing polymer and (OH-group-containing) inorg. compound)**
- IT Polysulfones, uses
 RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (polyether-silsesquioxane-, titanoxanes, proton-conductive **electrolyte membranes; (fuel cell) electrolyte membrane containing protonic-acid-bearing polymer and (OH-group-containing) inorg. compound)**
- IT Fuel cells
 (polymer electrolyte; (fuel cell) **electrolyte membrane containing protonic-acid-bearing polymer and (OH-group-containing) inorg. compound)**
- IT Polyethers, uses
 RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (polysulfone-, sulfo-containing, proton-conductive **electrolyte membranes; (fuel cell) electrolyte membrane containing protonic-acid-bearing polymer and (OH-group-containing) inorg. compound)**
- IT Polyethers, uses
 RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (polysulfone-silsesquioxane-, polysulfone polyether siloxane silsesquioxanes, sulfo-containing, proton-conductive **electrolyte membranes; (fuel cell) electrolyte membrane containing protonic-acid-bearing polymer and (OH-group-containing) inorg. compound)**
- IT Polyethers, uses
 RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (polysulfone-silsesquioxane-, titanoxanes, proton-conductive **electrolyte membranes; (fuel cell) electrolyte membrane containing protonic-acid-bearing polymer and (OH-group-containing) inorg. compound)**
- IT Ionic conductors
 (proton-conductive, **electrolyte membranes; in (fuel cell) electrolyte membrane containing protonic-acid-bearing polymer**

- and (OH-group-containing) inorg. compound)
- IT Polyimides, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(sulfo-containing, proton-conductive **electrolyte membranes; (fuel cell) electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)
- IT 123-54-6, Acetylacetone, uses
RL: NUU (Other use, unclassified); USES (Uses)
(chelating agents in **sol-gel** preparation of inorg. hydroxides; in **(fuel cell) electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)
- IT 13772-29-7P 14475-63-9P, Zirconium hydroxide 14644-61-2P
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(in **(fuel cell) electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)
- IT 1343-98-2, Silicon hydroxide 12651-23-9, Titanium hydroxide 21645-51-2, Aluminum hydroxide, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(in **(fuel cell) electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)
- IT 1071-76-7, Zirconium butoxide
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(precursors of **sol-gel** preparation of inorg. hydroxides; in **(fuel cell) electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)
- IT 875640-02-1DP, proton-exchanged 875640-02-1P 897018-88-1DP, proton-exchanged 897018-89-2P
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(proton-conductive **electrolyte membranes; (fuel cell) electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

L46 ANSWER 2 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:1130924 HCAPLUS

DOCUMENT NUMBER: 143:389830

TITLE: **Electrolyte membrane, method for producing membrane electrode assembly, and fuel cell**

INVENTOR(S): Hiraoka, Hideki

PATENT ASSIGNEE(S): Toagosei Co., Ltd., Japan

SOURCE: PCT Int. Appl., 32 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2005098875	A1	20051020	WO 2005-JP6737	20050406
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG CA 2562510 AA 20051020 CA 2005-2562510 20050406				
PRIORITY APPLN. INFO.: JP 2004-114822 A 20040408				
WO 2005-JP6737 W 20050406				

AB The invention relates to an **electrolyte membrane** for **fuel cells** having a structure wherein a **porous base** is filled with an **electrolyte polymer** is disclosed which has solved problems of lack of adhesion to an **electrode** and easily occurring flooding. This **electrolyte membrane** for **fuel cells** suppresses permeation of the fuel, and can be produced with high productivity at low cost. A method for producing an **electrolyte membrane** is disclosed wherein pores of a **porous base** are filled with an **electrolyte polymer** while exposing the surface of the porous base. The method for producing an **electrolyte membrane** is characterized in that the **polymer** is obtained from an ion exchange group-containing monomer or from a **solution** or dispersion wherein other components are blended to the monomer according to needs.

IC ICM H01B013-00
ICS H01B001-06; H01M008-02; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72, 76

ST ion exchanger **membrane electrode assembly**
polymer electrolyte fuel cell

IT **Fuel cell electrodes**
Ion exchangers
Membrane electrodes
(**membrane electrode assembly of polymer electrolyte fuel cell**)

IT Polyolefins
RL: DEV (Device component use); EPR (Engineering process); PEP

(Physical, engineering or chemical process); PROC (Process); USES
(Uses)

(membrane electrode assembly of polymer
electrolyte fuel cell)

IT Fuel cells

(polymer electrolyte; membrane
electrode assembly of polymer electrolyte
fuel cell)

REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR
THIS RECORD. ALL CITATIONS AVAILABLE IN
THE RE FORMAT

L46 ANSWER 3 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:1049281 HCAPLUS

DOCUMENT NUMBER: 143:327416

TITLE: Solid polymer electrolyte
membranes having roughened surfaces and
their composite membranes

INVENTOR(S): Ishikawa, Junichi; Omi, Katsuhiko; Toriida,
Masahiro; Fujiyama, Akiko; Takamatsu, Kuniyuki;
Tamai, Masashi

PATENT ASSIGNEE(S): Mitsui Chemicals Inc., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 15 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005268059	A2	20050929	JP 2004-79331	200403 19
PRIORITY APPLN. INFO.:				200403 19

AB The membranes, useful as fuel cell electrolytes, contain 100 parts aromatic hydrocarbon polymers bearing protonic acid groups and 0.01-50 parts inorg. fillers. Thus, a varnish containing 4.00 g disodium 5,5'-carbonylbis(2-fluorobenzenesulfonate)-4,4'-difluorobenzophenone-bis(3,5-dimethyl-4-hydroxyphenyl)methane copolymer and 0.04 g Wakogel LC 5H (silica; particle size 5 μ m) was cast on a glass sheet, dried, crosslinked with UV irradiation, and soaked in an aqueous H₂SO₄ soln. to give a membrane. Carbon paper was screen-printed with a paste containing Nafion and Denka Black (carbon particle), and hot-pressed with the membrane to give a membrane-electrode assembly model piece showing no delamination after soaking in 10% aqueous MeOH solution

IC ICM H01M008-02

ICS C08K003-00; C08L071-10; H01B001-06; H01M008-10

CC 38-3 (Plastics Fabrication and Uses)

Section cross-reference(s): 52

ST polymer fuel cell electrolyte

membrane adhesion; sulfo polyether polyketone

polyelectrolyte membrane silica; surface roughness polymer

fuel cell electrolyte membrane

- IT Polyketones
RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polyether-, sulfo-containing; solid polymer electrolyte membranes containing inorg. fillers and having roughened surfaces for fuel cell electrolytes)
- IT Polyethers, uses
RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polyketone-, sulfo-containing; solid polymer electrolyte membranes containing inorg. fillers and having roughened surfaces for fuel cell electrolytes)
- IT Fuel cell electrolytes
Polyelectrolytes
(solid polymer electrolyte membranes containing inorg. fillers and having roughened surfaces for fuel cell electrolytes)
- IT 7631-86-9, Sylysia 310P, uses
RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)
(Wakogel LC 5H, Sylysia 310P; solid polymer electrolyte membranes containing inorg. fillers and having roughened surfaces for fuel cell electrolytes)
- IT 515144-27-1DP, proton-exchanged
RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(solid polymer electrolyte membranes containing inorg. fillers and having roughened surfaces for fuel cell electrolytes)
- IT 210531-45-6P
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(solid polymer electrolyte membranes containing inorg. fillers and having roughened surfaces for fuel cell electrolytes)
- IT 345-92-6, 4,4'-Difluorobenzophenone
RL: RCT (Reactant); RACT (Reactant or reagent)
(solid polymer electrolyte membranes containing inorg. fillers and having roughened surfaces for fuel cell electrolytes)

L46 ANSWER 4 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:546311 HCAPLUS

DOCUMENT NUMBER: 143:81081

TITLE: Polymer electrolyte

composite membrane, its manufacture,
and solid polymer fuel
cell which uses the membrane

INVENTOR(S): Otsuki, Toshitaka; Higami, Makoto; Kanaoka,
Osayuki; Asano, Yoichi; Nanaumi, Masaaki; Soma,
Hiroshi

PATENT ASSIGNEE(S): JSR Ltd., Japan; Honda Motor Co., Ltd.

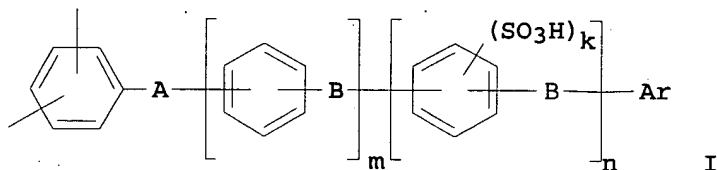
SOURCE: Jpn. Kokai Tokkyo Koho, 31 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005166557	A2	20050623	JP 2003-406364	20031204
PRIORITY APPLN. INFO.:			JP 2003-406364	20031204

GI



- AB The title membrane is obtained by filling a polyarylene, having a repeating unit I (A = divalent electron-withdrawing group; B = divalent electron donating group or direct coupling; Ar = aromatic group having -SO₃H substituent; m = integer 0-10; n = integer 0-10; and k = integer 1-4) containing sulfonate group filled into voids of a porous substrate. The membrane is manufactured by immersing the porous substrate in a solution of the polyarylene; and drying the substrate. The fuel cell has a membrane-electrode structure, containing the above membrane between a pair of electrode catalyst layers.
- IC ICM H01M008-02
 ICS C08J009-40; H01B001-06; H01B013-00; H01M008-10; C08L101-00
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
- ST **fuel cell polymer electrolyte membrane polyarylene manuf**
- IT **Fuel cell electrolytes**
Fuel cells
 (manufacture of electrolyte composite membranes having sulfonate group containing polyarylenes for fuel cells)
- IT Fluoropolymers, uses
 Polyimides, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
 (manufacture of electrolyte composite membranes having sulfonate group containing polyarylenes for fuel cells)
- IT 9002-84-0, PTFE 851883-22-2
 RL: TEM (Technical or engineered material use); USES (Uses)
 (manufacture of electrolyte composite membranes having sulfonate group containing polyarylenes for fuel cells)

L46 ANSWER 5 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
 ACCESSION NUMBER: 2005:116597 HCAPLUS
 DOCUMENT NUMBER: 142:201599
 TITLE: Direct-methanol **fuel cell**
 usable even below freezing point, and
electrolyte membrane and
membrane-electrode assembly
 used in the **fuel cell**
 INVENTOR(S): Yamaguchi, Takehisa; Harada, Hiroshi; Oya,
 Nobuo; Yao, Shigeru
 PATENT ASSIGNEE(S): Ube Industries, Ltd., Japan
 SOURCE: Jpn. Kokai Tokkyo Koho, 12 pp.
 CODEN: JKXXAF
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2005038669	A2	20050210	JP 2003-199011	200307 18
PRIORITY APPLN. INFO.: JP 2003-199011				200307 18

AB The **fuel cell** has an **electrolyte membrane** made of a **porous membrane** filled with a **polymer electrolyte** and uses a fuel of aqueous MeOH having MeOH concentration approx. ≥ 27 weight% (8 mol/L) to show output power d. at $23^\circ \geq 45$ mW/cm². Since the high-concentration MeOH aqueous **solution** is used, the **fuel cell** can be used below f.p. in cold area.

IC ICM H01M008-10
 ICS H01M008-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **fuel cell polymer electrolyte membrane electrode assembly**; direct methanol **fuel cell** freezing point

IT **Fuel cell electrolytes**
Polymer electrolytes
 (direct-methanol **fuel cell** using **porous membrane** filled with **polymer electrolyte** for use even below f.p.)

IT Polyimides, uses
 RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
 (polyether-, porous membrane; direct-methanol **fuel cell** using **porous membrane** filled with **polymer electrolyte** for use even below f.p.)

IT Polyethers, uses
 RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
 (polyimide-, porous membrane; direct-methanol **fuel cell** using **porous membrane** filled with **polymer electrolyte** for

use even below f.p.)

IT 67-56-1, Methanol, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
 (direct-methanol **fuel cell** using
porous membrane filled with
polymer electrolyte for use even below f.p.)

IT 69824-22-2P
 RL: DEV (Device component use); IMF (Industrial manufacture); PREP
 (Preparation); USES (Uses)
 (electrolyte; direct-methanol **fuel cell** using
porous membrane filled with
polymer electrolyte for use even below f.p.)

IT 26298-81-7P, 3,3',4,4'-Biphenyltetracarboxylic dianhydride-
 oxydianiline **copolymer** 26615-45-2P
 RL: DEV (Device component use); IMF (Industrial manufacture); PREP
 (Preparation); USES (Uses)
 (porous membrane; direct-methanol **fuel cell**
 using **porous membrane filled with**
polymer electrolyte for use even below f.p.)

L46 ANSWER 6 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:35078 HCAPLUS

DOCUMENT NUMBER: 142:138310

TITLE: Integrated **electrolyte**
membrane-electrode laminate
 for electrochemical device and its manufacture

INVENTOR(S): Wan, Nianfang; Wang, Gang

PATENT ASSIGNEE(S): Xu, Gang, Peop. Rep. China; Li, Sanyou

SOURCE: PCT Int. Appl., 30 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: Chinese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2005004274	A1	20050113	WO 2003-CN527	20030703
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
AU 2003304303	A1	20050121	AU 2003-304303	20030703
CN 1788381	A	20060614	CN 2003-826702	20030703
PRIORITY APPLN. INFO.:				WO 2003-CN527 A

200307
03

AB The laminate comprises a **polymer** substrate, having high porosity or microporous structure; a porous conductive sheet on both sides of the substrate for supporting the substrate and conducting current to external circuit; an ion exchange **resin** filled inside the **substrate** pores to form a fine and gas impermeable film; and a 1st catalyst layer on outside of the 2 porous conductive sheet. The laminate is manufactured by preparing a porous conductive sheet and the required **polymer** substrate; placing the conductive sheet on both sides of the substrate; injecting an ion exchange **resin solution** to the substrate and volatilizing the solvent in the **resin solution**; and compounding a 1st catalyst layer on outside of the 2 conductive sheet.

IC ICM H01M008-10
ICS H01M008-02; H01M002-14

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **fuel cell electrolyte membrane electrode** laminate structure manuf H

IT **Fuel cell electrodes**
Fuel cell electrolytes
(structure and manufacture of integrated **electrolyte membrane-electrode** laminates for **fuel cells**)

REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L46 ANSWER 7 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2004:893437 HCAPLUS

DOCUMENT NUMBER: 142:97385

TITLE: Method for preparing composite **polymer membrane of polymer electrolyte membrane fuel cell (pemfc)** and method for preparing composite **polymer membrane/electrode** assembly by using the same

INVENTOR(S): Baek, Dong Hyeon; Jun, Yeong Gap; Kim, Chang Su; Kwak, Sang Hui; Shin, Dong Ryeol

PATENT ASSIGNEE(S): Korea Institute of Energy Research, S. Korea

SOURCE: Repub. Korean Kongkae Taeho Kongbo, No pp. given
CODEN: KRXXA7

DOCUMENT TYPE: Patent

LANGUAGE: Korean

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	
KR 2001061632	A	20010707	KR 1999-64130	19991228
				19991228

PRIORITY APPLN. INFO.: KR 1999-64130

- AB A method for preparing a composite **polymer membrane of polymer electrolyte membrane fuel cell (PEMFC)** is provided which lowers the price of the **polymer membrane**, produces the **electrolytic polymer membrane** having a relatively thin thickness and reduces expansion and contraction of the **polymer membrane**. And a method for preparing a composite **polymer membrane/electrode assembly** by using the same is provided. The method for preparing a composite **polymer membrane** comprises steps of: (i) hot pressing or rolling a **perfluorosulfonylfluoride/TFE copolymer resin** at 200-250 °C to obtain a pre-formed precursor sheet; (ii) after **inserting a porous membrane** in the center of the pre-formed precursor sheet, hot pressing or rolling it to obtain a composite sheet of the pre-formed precursor and the porous membrane; (iii) treating the composite sheet with an aqueous **solution of sodium hydroxide** in a 5-30 weight ratio to convert the composite pre-formed sheet consisting of the composite **perfluorosulfonylfluoride/TFE copolymer resin** into a Na⁺ formed composite **perfluorosulfonate polymer membrane**; and (iv) ion exchanging the Na⁺ formed composite **perfluorosulfonate polymer membrane** with H⁺ to convert it into a H⁺ formed composite **perfluorosulfonate polymer membrane**. The composite **polymer membrane/electrode assembly** is prepared by the steps of: (i) hot pressing or rolling a **perfluorosulfonylfluoride/TFE copolymer resin** at 200-250 °C to obtain a pre-formed precursor sheet; (ii) after **inserting a porous membrane** in the center of the pre-formed precursor sheet, hot pressing or rolling it to obtain a composite sheet of the pre-formed precursor and the porous membrane; (iii) treating the composite sheet with an aqueous **solution of sodium hydroxide** in a 5-30 weight ratio to convert the composite pre-formed sheet consisting of the composite **perfluorosulfonylfluoride/TFE copolymer resin** into a Na⁺ formed composite **perfluorosulfonate polymer membrane**; (iv) coating the Na⁺ formed composite **perfluorosulfonate polymer membrane** with a platinum catalyst ink; and (v) hot pressing the catalyst ink coated composite **polymer membrane** at 120-200 °C to produce a composite **polymer membrane/electrode assembly**.
- IC ICM H01M008-06
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 48
- ST **polymer electrolyte membrane fuel cell fluorinated sulfonated polyelectrolyte electrode**
- IT Membranes, nonbiological
(composite; preparing composite **polymer membrane of polymer electrolyte membrane fuel cell pemfc** and method for preparing composite **polymer membrane electrode assembly** by using same)
- IT Ionomers
RL: DEV (Device component use); EPR (Engineering process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(fluoropolymers, sulfo-containing; preparing composite **polymer membrane of polymer electrolyte membrane fuel cell pemfc** and method for preparing composite **polymer membrane electrode**)

- assembly by using same)
- IT Fluoropolymers, uses
RL: DEV (Device component use); EPR (Engineering process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(ionomers, sulfo-containing; preparing composite **polymer membrane of polymer electrolyte membrane fuel cell pemfc** and method for preparing composite **polymer membrane electrode assembly** by using same)
- IT Fuel cells
(**polymer electrolyte**; preparing composite **polymer membrane of polymer electrolyte membrane fuel cell pemfc** and method for preparing composite **polymer membrane electrode assembly** by using same)
- IT Membrane electrodes
Polyelectrolytes
(preparing composite **polymer membrane of polymer electrolyte membrane fuel cell pemfc** and method for preparing composite **polymer membrane electrode assembly** by using same)
- IT Ion exchange
(proton; preparing composite **polymer membrane of polymer electrolyte membrane fuel cell pemfc** and method for preparing composite **polymer membrane electrode assembly** by using same)
- IT Thermal expansion
(reduced coefficient; preparing composite **polymer membrane of polymer electrolyte membrane fuel cell pemfc** and method for preparing composite **polymer membrane electrode assembly** by using same)
- IT Porous materials
(support membrane; preparing composite **polymer membrane of polymer electrolyte membrane fuel cell pemfc** and method for preparing composite **polymer membrane electrode assembly** by using same)
- IT Molding of plastics and rubbers
(thermal compression; preparing composite **polymer membrane of polymer electrolyte membrane fuel cell pemfc** and method for preparing composite **polymer membrane electrode assembly** by using same)
- IT 7440-06-4, Platinum, uses
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
(preparing composite **polymer membrane of polymer electrolyte membrane fuel cell pemfc** and method for preparing composite **polymer membrane electrode assembly** by using same)
- IT 116-14-3D, Tetrafluoroethene, copolymers with perfluorosulfonyl fluoride- containing monomers
RL: DEV (Device component use); RCT (Reactant); TEM (Technical or engineered material use); RACT (Reactant or reagent); USES (Uses)
(preparing composite **polymer membrane of**

**polymer electrolyte membrane
fuel cell pemfc and method for preparing composite
polymer membrane electrode assembly by using
same)**

IT 1310-73-2, Sodium hydroxide (Na(OH)), reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(preparing composite **polymer membrane of
polymer electrolyte membrane
fuel cell pemfc and method for preparing composite
polymer membrane electrode assembly by using
same)**)

L46 ANSWER 8 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2002:781958 HCAPLUS

DOCUMENT NUMBER: 138:224060

TITLE: A Pore-Filling Electrolyte
Membrane-Electrode Integrated
System for a Direct Methanol Fuel
Cell Application

AUTHOR(S): Yamaguchi, Takeo; Ibe, Masaya; Nair, Balagopal
N.; Nakao, Shin-ichi

CORPORATE SOURCE: Department of Chemical System Engineering, The
University of Tokyo, Bunkyo-ku, Tokyo, 113-8656,
Japan

SOURCE: Journal of the Electrochemical Society (2002),
149(11), A1448-A1453
CODEN: JESOAN; ISSN: 0013-4651

PUBLISHER: Electrochemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A novel **electrolyte membrane** is needed to
develop a high performance direct methanol **fuel
cell**. This membrane should be durable up to 130° to
improve the catalytic reaction and MeOH crossover should be reduced.
A pore-filled polyelectrolyte membrane was designed where the
polyelectrolyte is **filled** into the pores of a
porous substrate. This creates an integrated system with a
membrane and a catalyst layer. The porous substrate was completely
inert to aqueous MeOH **solution** and was durable at high temperature. The
substrate matrix could suppress membrane swelling to reduce MeOH
crossover and had mech. strength at high temps. A radical
polymerization technique was used to fabricate the pore-filling
membrane. A porous SiO₂ sol-gel thin-base membrane on a C
electrode was used as a **membrane-electrode**
integrated system. The **substrate** pores were
filled with an acrylic acid-vinylsulfonic acid
copolymer network. The membranes showed high proton conductivity,
thermal stability, and low MeOH permeation.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **fuel cell electrolyte membrane
electrode polymer porous silica; acrylic acid
vinylsulfonic acid polymer electrolyte fuel
cell**

IT **Fuel cell electrodes
Fuel cell electrolytes
(polymer electrolyte-filled
porous silica membrane integrated with
electrode for direct methanol fuel
cells)**

IT 7440-44-0, Carbon, uses

RL: DEV (Device component use); USES (Uses)
 (electrode; polymer electrolyte-
 filled porous silica membrane
 integrated with electrode for direct methanol
 fuel cells)

IT 25053-28-5, Acrylic acid-vinylsulfonic acid copolymer
 501005-91-0

RL: DEV (Device component use); USES (Uses)
 (electrolyte; polymer electrolyte-
 filled porous silica membrane
 integrated with electrode for direct methanol
 fuel cells)

IT 7631-86-9, Silica, uses

RL: DEV (Device component use); USES (Uses)
 (substrate; polymer electrolyte-
 filled porous silica membrane
 integrated with electrode for direct methanol
 fuel cells)

REFERENCE COUNT: 18 THERE ARE 18 CITED REFERENCES AVAILABLE
 FOR THIS RECORD. ALL CITATIONS AVAILABLE
 IN THE RE FORMAT

L46 ANSWER 9 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2000:646292 HCAPLUS

DOCUMENT NUMBER: 133:225582

TITLE: Electrolyte membranes for
 fuel cells, their manufacture,
 fuel cells, and manufacture of
 the fuel cells

INVENTOR(S): Yamaguchi, Takeo; Nakao, Shinichi

PATENT ASSIGNEE(S): Center for Advanced Science and Technology
 Incubation, Ltd., Japan

SOURCE: PCT Int. Appl., 20 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2000054351	A1	20000914	WO 2000-JP1370	20000307
W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
AU 2000028310	A5	20000928	AU 2000-28310	20000307
EP 1202365	A1	20020502	EP 2000-906746	20000307

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,
PT, IE, SI, LT, LV, FI, RO, MK, CY, AL

PRIORITY APPLN. INFO.:

JP 1999-60817

A

199903
08

WO 2000-JP1370

W

200003
07

- AB The **electrolyte membranes** have a proton conductive **polymer filled** in the pores fo a **porous** substrate not swellable by MeOH or H2O. The substrate is an inorg. material or a heat resistant **polymer**. The membranes are prepared by irradiating the porous substrate with an energy beam and contacting the substrate with a monomer to form the **polymer**. The **fuel cells** have the **electrolyte membrane** formed on the catalyst layers of their cathodes or anodes, and are prepared by applying **sol** on an **electrode**, converting the **sol** layer to a **porous substrate** film, filling the pores in the film with the proton conductive **polymer**, and laminating with the other **electrode**.
- IC ICM H01M008-02
ICS H01M008-10
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
- ST **fuel cell** proton conductive **polymer** electrolyte; **polymer** electrolyte porous substrate **fuel cell**
- IT Plasma
(argon plasma in manufacture of **polymer electrolyte membranes** containing heat resistant porous substrates for **fuel cells**)
- IT **Fuel cell** electrolytes
(manufacture of **polymer electrolyte membranes** containing heat resistant porous substrates for **fuel cells**)
- IT Fluoropolymers, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(manufacture of **polymer electrolyte membranes** containing heat resistant porous substrates for **fuel cells**)
- IT 9002-84-0, Teflon 9003-01-4, Polyacrylic acid
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(manufacture of **polymer electrolyte membranes** containing heat resistant porous substrates for **fuel cells**)
- IT 7440-37-1, Argon, uses
RL: NUU (Other use, unclassified); USES (Uses)
(manufacture of **polymer electrolyte membranes** containing heat resistant porous substrates for **fuel cells**)

REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR
THIS RECORD. ALL CITATIONS AVAILABLE IN
THE RE FORMAT

L46 ANSWER 10 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2000:609047 HCAPLUS

MEI HUANG EIC1700 REM4B28 571-272-3952

14/12/2006

DOCUMENT NUMBER: 133:180395
 TITLE: Solid gel membrane
 INVENTOR(S): Chen, Muguo; Tsai, Tsepin; Yao, Wayne; Chang, Yuen-ming; Li, Lin-feng; Tom, Karen
 PATENT ASSIGNEE(S): Reveo, Inc., USA
 SOURCE: PCT Int. Appl., 44 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 5
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2000051198	A2	20000831	WO 2000-US4881	20000225
WO 2000051198	A3	20010111		
W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW				
RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 2003099872	A1	20030529	US 1999-259068	19990226
US 6605391	B2	20030812		
US 6358651	B1	20020319	US 2000-482126	20000111
CA 2362298	AA	20000831	CA 2000-2362298	20000225
EP 1155467	A2	20011121	EP 2000-913617	20000225
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
BR 2000008506	A	20020205	BR 2000-8506	20000225
JP 2002538585	T2	20021112	JP 2000-601703	20000225
AU 772935	B2	20040513	AU 2000-35030	20000225
PRIORITY APPLN. INFO.:				20000225
US 1999-259068				A
US 2000-482126				A
				20000111

WO 2000-US4881

W

200002

25

- AB A highly conductive **polymer** based solid gel membrane is especially well-suited for use in such electrochem. devices as metal/air, Zn/MnO₂, Ni/Cd batteries and hydrogen **fuel cells**, as well as in electrochromic devices such as smart windows and flat panel displays. Furthermore, in rechargeable electrochem. cells, the solid gel membrane is highly-effective for use as a separator between the anode and charging **electrode**. In accordance with the principles of the invention, the highly conductive membrane comprises a support or substrate and a **polymeric** gel composition having an ionic species contained in a **solution** phase thereof. The **polymer**-based gel is prepared by adding an ionic species to a monomer **solution** followed by **polymerization**. After **polymerization**, the ionic species is **embedded** in the **polymer-based** gel where it remains. The ionic species behaves like a liquid electrolyte, while at the same time, the **polymer**-based solid gel membrane provides a smooth impenetrable surface that allows for the exchange of ions. An advantage of the novel membrane is that its measured ionic conductivity is much higher than previously observed in prior art solid electrolytes or electrolyte-**polymer** films.
- IC ICM H01M006-22
ICS H01M012-06; H01B001-12; C08F251-02; C08F257-02; C08L051-02; C08F251-00; C08F273-00; B01D069-10; G02F001-15
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 35, 38, 74
- ST battery **electrolyte gel membrane**; **fuel cell electrolyte gel membrane**; electrochromic device **electrolyte gel membrane**; display device **electrolyte gel membrane**
- IT Windows
Windows
(electrochromic; ionic conducting **polymer**-based solid gel membrane)
- IT Optical imaging devices
(flat panel; ionic conducting **polymer**-based solid gel membrane)
- IT **Fuel cell separators**
Fuel cells
Polymerization
Polymerization catalysts
Secondary batteries
Secondary battery separators
(ionic conducting **polymer**-based solid gel membrane)
- IT Polyamides, uses
Polyolefins
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(ionic conducting **polymer**-based solid gel membrane)
- IT Polyesters, uses
Polysulfones, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(ionic conducting **polymer**-based solid gel membrane)
- IT Alkali metal oxides
RL: CAT (Catalyst use); USES (Uses)
(peroxides; ionic conducting **polymer**-based solid gel

- membrane)
- IT Peroxysulfates
RL: CAT (Catalyst use); USES (Uses)
(peroxydisulfates, alkali metal; ionic conducting **polymer**-based solid gel membrane)
- IT **Polymerization**
(photopolymn.; ionic conducting **polymer**-based solid gel membrane)
- IT **Polymerization**
(radiochem.; ionic conducting **polymer**-based solid gel membrane)
- IT Electrochromic devices
Electrochromic devices
(windows; ionic conducting **polymer**-based solid gel membrane)
- IT 50926-11-9, Ito
RL: TEM (Technical or engineered material use); USES (Uses)
(glass; ionic conducting **polymer**-based solid gel membrane)
- IT 7727-54-0, Ammonium persulfate
RL: CAT (Catalyst use); USES (Uses)
(ionic conducting **polymer**-based solid gel membrane)
- IT 1313-13-9, Manganese dioxide, uses 1313-99-1, Nickel oxide, uses 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-93-2, Lithium, uses 7439-95-4, Magnesium, uses 7440-02-0, Nickel, uses 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-43-9, Cadmium, uses 7440-44-0, Carbon, uses 7440-66-6, Zinc, uses 11104-61-3, Cobalt oxide 12194-71-7, Perovskite 20667-12-3, Silver oxide 30280-72-9, Acrylic acid-methylenebisacrylamide **copolymer** 84943-80-6, Acrylic acid-methylenebisacrylamide-1-vinyl-2-pyrrolidinone **copolymer**
RL: DEV (Device component use); USES (Uses)
(ionic conducting **polymer**-based solid gel membrane)
- IT 1310-58-3, Potassium hydroxide, uses 1310-65-2, Lithium hydroxide 1310-73-2, Sodium hydroxide, uses 7601-90-3, Perchloric acid, uses 7647-01-0, Hydrochloric acid, uses 7647-14-5, Sodium chloride, uses 7664-38-2, Phosphoric acid, uses 7664-93-9, Sulfuric acid, uses 7778-80-5, Potassium sulfate, uses 9002-89-5, Polyvinyl alcohol 9004-34-6, Cellulose, uses 12125-02-9, Ammonium chloride, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(ionic conducting **polymer**-based solid gel membrane)
- IT 79-06-1, 2-Propenamide, reactions 79-10-7, Acrylic acid, reactions 79-41-4, reactions 88-12-0, 1-Vinyl-2-pyrrolidinone, reactions 110-17-8, Fumaric acid, reactions 110-26-9 541-47-9, 3,3-Dimethyl acrylic acid 627-64-5, Fumaramide 2210-25-5, N-Isopropylacryl amide 2680-03-7 3039-83-6, Vinylsulfonic acid, sodium salt 10117-38-1, Potassium sulfite
RL: RCT (Reactant); RACT (Reactant or reagent)
(ionic conducting **polymer**-based solid gel membrane)
- IT 9004-32-4, Carboxymethyl cellulose 9005-25-8, Corn starch, uses 25038-59-9, Polyethylene terephthalate, uses 25704-18-1, Poly(sodium 4-styrenesulfonate) 97917-26-5, Acrylamide-Methacrylic acid-methylenebis(acrylamide) **copolymer** 104983-61-1, Maleic acid-styrenesulfonic acid **copolymer**, sodium salt
RL: TEM (Technical or engineered material use); USES (Uses)
(ionic conducting **polymer**-based solid gel membrane)

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L51 ANSWER 1 OF 4 HCAPLUS COPYRIGHT 2006 ACS on STN
 ACCESSION NUMBER: 2006:33823 HCAPLUS
 DOCUMENT NUMBER: 144:111307
 TITLE: Direct methanol fuel cells, their **proton**
-conductive electrolyte
membranes having inorganic
skeletons, and manufacture thereof
 INVENTOR(S): Suzuki, Takayuki; Chiba, Takato
 PATENT ASSIGNEE(S): Konica Minolta Holdings, Inc., Japan
 SOURCE: Jpn. Kokai Tokkyo Koho, 17 pp.
 CODEN: JKXXAF
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006012527	A2	20060112	JP 2004-186208	200406 24
PRIORITY APPLN. INFO.: JP 2004-186208				200406 24

AB The **electrolyte membranes** with high **proton conductivity** and reducing MeOH crossover, comprise **porous inorg. films filling, in their pores, proton-conductive polymers** prepared from sulfonic acid group-containing ethylenically unsatd. compds. and compds. (R1O)nSiR2m (R1 = C≤4 alkyl; R2 = **copolymerizable organic group; m, n = 1-3; m + n = 4**). The membranes are formed by firing of precursors obtained from **inorg. and organic particle dispersions**.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38

ST direct methanol fuel cell electrolyte crossover suppressed;
proton cond hybrid polymer electrolyte
 DMFC; styryltrimethoxysilane vinylsulfonic acid **copolymer**
 DMFC electrolyte

IT Fuel cells
 (direct methanol; **proton-conductive electrolyte membranes filling sulfonic acid-containing polymers in porous ceramics for DMFC**)

IT Ionic conductors
 (**proton conductive; proton-conductive electrolyte membranes filling sulfonic acid-containing polymers in porous ceramics for DMFC**)

IT 7631-86-9, Snowtex 50, uses
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
 (colloidal, **electrolyte membrane skeletons; proton-conductive electrolyte membranes filling sulfonic acid-containing**

polymers in porous ceramics for DMFC)
 IT 872580-31-9P 872580-32-0P 872580-33-1P 872580-34-2P
 872580-35-3P 872580-36-4P 872580-37-5P 872580-38-6P
 872580-39-7P 872580-40-0P
 RL: DEV (Device component use); IMF (Industrial manufacture); PREP
 (Preparation); USES (Uses)
**(electrolyte membranes; proton-
 conductive electrolyte membranes
 filling sulfonic acid-containing polymers in
 porous ceramics for DMFC)**
 IT 9003-53-6, Polystyrene
 RL: NUU (Other use, unclassified); USES (Uses)
**(pore formers; proton-conductive
 electrolyte membranes filling
 sulfonic acid-containing polymers in porous
 ceramics for DMFC)**

L51 ANSWER 2 OF 4 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:13443 HCAPLUS

DOCUMENT NUMBER: 144:111257

TITLE: Method of preparation of **polymer**
 membrane for fuel cell

INVENTOR(S): Kim, Hee-Tak; Kim, Hyoung-Juhn; Yoon, Hae-Kwon;
 Kweon, Ho-Jin

PATENT ASSIGNEE(S): S. Korea

SOURCE: U.S. Pat. Appl. Publ., 10 pp.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 2006003209	A1	20060105	US 2005-153699	200506 14
KR 2006001628	A	20060106	KR 2004-50771	200406 30
JP 2006019273	A2	20060119	JP 2005-183915	200506 23
CN 1716671	A	20060104	CN 2005-10081381	200506 28
PRIORITY APPLN. INFO.:			KR 2004-50771	A 200406 30

AB A **polymer electrolyte membrane** for a
 fuel cell includes a **porous** membrane formed with fine
 pores, hygroscopic **polymer** layers coated inside the fine
 pores of the **porous** membrane, and **proton**
conductive polymers filled in the fine
 pores of the **porous** membrane coated with the hygroscopic
polymer layers.

INCL 429029000; 429033000; 429129000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

ST **polymer** membrane prepn fuel cell

IT Ketones, uses
RL: DEV (Device component use); USES (Uses)
(aromatic, **polymers**; **porous polymer**
membrane containing **proton conductive**
polymers for fuel cells)

IT Coating process
(dip; **porous polymer** membrane containing
proton conductive polymers for fuel
cells)

IT Coating process
(doctor-blading and silk-screening; **porous**
polymer membrane containing **proton**
conductive polymers for fuel cells)

IT Rayon, uses
RL: DEV (Device component use); USES (Uses)
(fabrics, nonwoven; **porous polymer** membrane
containing **proton conductive polymers**
for fuel cells)

IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(fluorine- and sulfo-containing, ionomers; **porous**
polymer membrane containing **proton**
conductive polymers for fuel cells)

IT Carboxylic acids, uses
RL: DEV (Device component use); USES (Uses)
(perfluoro, **polymers**; **porous polymer**
membrane containing **proton conductive**
polymers for fuel cells)

IT Sulfonic acids, uses
RL: DEV (Device component use); USES (Uses)
(perfluorosulfonic acid **polymers**; **porous**
polymer membrane containing **proton**
conductive polymers for fuel cells)

IT Polyketones
RL: DEV (Device component use); USES (Uses)
(polyether-, sulfides, defluorinated; **porous**
polymer membrane containing **proton**
conductive polymers for fuel cells)

IT Polyimides, uses
Polysulfones, uses
RL: DEV (Device component use); USES (Uses)
(polyether-; **porous polymer** membrane containing
proton conductive polymers for fuel
cells)

IT Polyethers, uses
RL: DEV (Device component use); USES (Uses)
(polyimide-; **porous polymer** membrane containing
proton conductive polymers for fuel
cells)

IT Polyethers, uses
RL: DEV (Device component use); USES (Uses)
(polyketone-, sulfides, defluorinated; **porous**
polymer membrane containing **proton**
conductive polymers for fuel cells)

IT Fuel cells
(**polymer electrolyte**; **porous**
polymer membrane containing **proton**
conductive polymers for fuel cells)

- IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
- IT Ionomers
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
- IT Polyquinoxalines
RL: DEV (Device component use); USES (Uses)
(polyphenylquinoxalines; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
- IT Polyethers, uses
RL: DEV (Device component use); USES (Uses)
(polysulfone-; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
- IT Conducting **polymers**
Lithography
Porosity
Spraying
(**porous polymer** membrane containing **proton conductive polymers** for fuel cells)
- IT Fluoropolymers, uses
Glass fibers, uses
Polyamides, uses
Polybenzimidazoles
Polyesters, uses
Polyimides, uses
Polyolefins
Polyoxyalkylenes, uses
Polyoxymethylenes, uses
Polysulfones, uses
Polythiophenylenes
RL: DEV (Device component use); USES (Uses)
(**porous polymer** membrane containing **proton conductive polymers** for fuel cells)
- IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(sulfo-containing, perfluoro; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
- IT 7440-06-4, Platinum, uses
RL: CAT (Catalyst use); USES (Uses)
(**porous polymer** membrane containing **proton conductive polymers** for fuel cells)
- IT 7440-44-0, Carbon, uses
RL: CAT (Catalyst use); TEM (Technical or engineered material use);
USES (Uses)
(**porous polymer** membrane containing **proton conductive polymers** for fuel cells)
- IT 9002-81-7, **Polymethylene oxide** 9002-84-0, **Ptfe**
9002-89-5, **Polyvinyl alcohol** 25249-16-5, **PHEMA** 25322-68-3, **Peo**

25322-69-4, Polypropylene oxide 25734-65-0, Poly(2,2'-(m-phenylene)-5,5'-bibenzimidazole 25736-86-1, Polyethylene glycol methacrylate 25852-47-5, Polyethylene oxide dimethacrylate 26403-58-7, Polyethylene glycol acrylate 26570-48-9, Polyethylene oxide diacrylate 32109-42-5, Poly(2,5-benzimidazole) 62487-95-0, Polyhydroxymethyl acrylate

RL: DEV (Device component use); USES (Uses)

(porous polymer membrane containing proton conductive polymers for fuel cells)

L51 ANSWER 3 OF 4 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:7296 HCAPLUS

DOCUMENT NUMBER: 144:111251

TITLE: Method of fabrication of polymer electrolyte membrane for fuel cell

INVENTOR(S): Kim, Hee-Tak; Kim, Hyoung-Juhn; Kweon, Ho-Jin

PATENT ASSIGNEE(S): S. Korea

SOURCE: U.S. Pat. Appl. Publ., 9 pp.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO. -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
US 2006003214	A1	20060105	US 2005-173070	20050630
KR 2006001627	A	20060106	KR 2004-50770	20040630
JP 2006019294	A2	20060119	JP 2005-190558	20050629
CN 1716672	A	20060104	CN 2005-10081385	20050630
PRIORITY APPLN. INFO.:			KR 2004-50770	A 20040630

AB A polymer electrolyte membrane for a fuel cell includes a porous membrane forming micropores. Proton-conducting polymers fill the micropores of the porous membrane. In addition, a method for preparing the polymer electrolyte membrane includes: preparing a porous membrane having a plurality of micropores; and filling the micropores with proton-conducting polymer.

INCL 429030000; 429033000; 521027000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology) Section cross-reference(s): 38

ST polymer electrolyte membrane fuel cell

IT Glass fibers, uses

RL: DEV (Device component use); USES (Uses)
(cellular; polymer electrolyte

- membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Rayon, uses
RL: DEV (Device component use); USES (Uses)
(fabrics, nonwoven, porous; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(fluorine- and sulfo-containing, ionomers; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Cellular materials
RL: DEV (Device component use); USES (Uses)
(glass fibers; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Carboxylic acids, uses
RL: DEV (Device component use); USES (Uses)
(perfluoro, polymers, porous; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Sulfonic acids, uses
RL: DEV (Device component use); USES (Uses)
(perfluorosulfonic acid polymers, porous; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Polyketones
RL: DEV (Device component use); USES (Uses)
(polyether-, defluorinated, sulfides, porous; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Polyimides, uses
Polysulfones, uses
RL: DEV (Device component use); USES (Uses)
(polyether-, porous; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Polyethers, uses
RL: DEV (Device component use); USES (Uses)
(polyimide-, porous; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Polyethers, uses
RL: DEV (Device component use); USES (Uses)
(polyketone-, defluorinated, sulfides, porous; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Fuel cell electrolytes
(polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)

- IT Polyesters, uses
RL: DEV (Device component use); USES (Uses)
(polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Fuel cells
(polymer electrolyte; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Ionomers
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Polyethers, uses
RL: DEV (Device component use); USES (Uses)
(polysulfone-, porous; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Membranes, nonbiological
(porous; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Fluoropolymers, uses
Polyamides, uses
Polybenzimidazoles
Polyimides, uses
Polyolefins
Polysulfones, uses
RL: DEV (Device component use); USES (Uses)
(porous; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(sulfo-containing, perfluoro, porous; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT 25734-65-0, Poly[2,2'-(m-phenylene)-5,5'-bibenzimidazole]
32109-42-5, Poly(2,5-benzimidazole)
RL: DEV (Device component use); USES (Uses)
(polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)
- IT 9002-84-0, Ptfе 9002-88-4, Polyethylene 25038-59-9, uses
RL: DEV (Device component use); USES (Uses)
(porous; polymer electrolyte membrane for fuel cell from porous membrane and proton-conducting polymer)

L51 ANSWER 4 OF 4 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2001:314816 HCAPLUS

DOCUMENT NUMBER: 135:95113

TITLE: Proton conducting
membranes based on
electrolyte filled
microporous matrices

AUTHOR(S): Haufe, S.; Stimming, U.

CORPORATE SOURCE: E19, Department of Physics, Interfaces and
Energy Conversion, Technische Universitat
Munchen, Garching, D-85748, GermanySOURCE: Journal of Membrane Science (2001), 185(1),
95-103

CODEN: JMESDO; ISSN: 0376-7388

PUBLISHER: Elsevier Science B.V.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Polysulfone and microglass fiber fleeces were used as **microporous** supports for electrolyte based composites. The membranes were prepared by impregnating the matrix with various **inorg.** acids as well as with a 5 weight% Nafion solution. Among the various combinations of **microporous** supports and electrolytes both types of fleece filled with 5 mol/dm³ H₂SO₄ and the microglass fiber fleece impregnated with Nafion (.apprx.26 weight% uptake) exhibit a resistance similar to that of Nafion-117 (0.530 Ω-cm²), whereas the polysulfone fleece soaked in Nafion[®] shows a distinctively higher ohmic resistance. With regard to the material properties, the polysulfone/H₂SO₄ composite exhibits a specific conductivity higher than Nafion-117 but still more than an order of magnitude lower than expected on the basis of the **porosity** of the support (83%) and the specific conductivity of the acid. Therefore, the uptake of electrolyte seems to depend strongly on the surface characteristics of the **microporous** support. H₂/O₂ fuel cell measurements with MEAs obtained by using a cold press technique reveal performances comparable to MEAs with Nafion-117 electrolyte for both the polysulfone/H₂SO₄ composite and the microglass fiber/Nafion composite.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 72, 76

ST **proton conducting membrane**
electrolyte filled microporous matrix;
polysulfone microglass fiber fleece electrolyte fuel cell

IT Polysulfones, uses
RL: DEV (Device component use); USES (Uses)
(fiber; **proton conducting membranes**
based on electrolyte filled
microporous matrixes)

IT Glass fibers, uses
RL: DEV (Device component use); USES (Uses)
(microfibers; **proton conducting**
membranes based on electrolyte
filled microporous matrixes)

IT Synthetic polymeric fibers, uses
RL: DEV (Device component use); USES (Uses)
(polysulfones; **proton conducting**
membranes based on electrolyte
filled microporous matrixes)

IT Fuel cell electrolytes
(**proton conducting membranes**
based on electrolyte filled

microporous matrixes)
IT Ionic conductivity
(proton; proton conducting
membranes based on electrolyte
filled microporous matrixes)
IT 7664-93-9, Sulfuric acid, uses
RL: DEV (Device component use); USES (Uses)
(electrolyte; proton conducting
membranes based on electrolyte
filled microporous matrixes)
IT 66796-30-3, Nafion-117
RL: DEV (Device component use); USES (Uses)
(proton conducting membranes
based on electrolyte filled
microporous matrixes)

REFERENCE COUNT: 18 THERE ARE 18 CITED REFERENCES AVAILABLE
FOR THIS RECORD. ALL CITATIONS AVAILABLE
IN THE RE FORMAT

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L53 ANSWER 1 OF 1 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:443108 HCAPLUS
DOCUMENT NUMBER: 144:471407
TITLE: Proton-conductive
electrolyte membranes for
polymer-electrolyte fuel cells, and
same fuel cells
INVENTOR(S): Emori, Hideyuki; Yamamoto, Kazunari
PATENT ASSIGNEE(S): Nitto Denko Corp., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 12 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006120510	A2	20060511	JP 2004-308150	200410 22
PRIORITY APPLN. INFO.:				200410 22

AB The electrolyte membranes are constituted by
porous substrates and proton-conductive
polymers filled in the pores. The porous
substrates are composed of (A) 50-99 weight% of first polymers containing
polyolefins with weight-average mol. weight of $\geq 500,000$, and optionally
thermoplastic elastomers and/or graft copolymers
, and (B) 1-50 weight% of second polymers bearing double bond on main-
or side chains whose $\geq 1\%$ is substituted with epoxy groups.
The membranes show high proton conductivity and inhibit
methanol permeation.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 39

ST **proton conductive polymer electrolyte**
membrane fuel cell; polyolefin blend polymer electrolyte
fuel cell

IT Styrene-butadiene rubber, uses
RL: DEV (Device component use); USES (Uses)
(block, triblock, epoxidized, Epofriend A 1005, in **porous**
substrates of **membranes**; in **proton-**
conductive electrolyte membranes for
polymer-electrolyte fuel cells)

IT Polyolefins
Thermoplastic rubber
RL: DEV (Device component use); USES (Uses)
(in **porous** substrates of **membranes**;
proton-conductive electrolyte
membranes for polymer-electrolyte fuel cells)

IT Fuel cells
(polymer **electrolyte**; **proton-**
conductive electrolyte membranes for
polymer-electrolyte fuel cells)

IT Polyelectrolytes
(**proton-conductive**; **proton-**
conductive electrolyte membranes for
polymer-electrolyte fuel cells)

IT 9002-88-4, Polyethylene
RL: DEV (Device component use); USES (Uses)
(in **porous** substrates of **membranes**;
proton-conductive electrolyte
membranes for polymer-electrolyte fuel cells)

IT 69824-22-2P
RL: DEV (Device component use); IMF (Industrial manufacture); PREP
(Preparation); USES (Uses)
(**proton conductor**, in pores of **porous**
substrates; **proton-conductive**
electrolyte membranes for polymer-
electrolyte fuel cells)

IT 694491-73-1D, block, triblock, epoxidized 694491-73-1D, epoxidized
RL: DEV (Device component use); USES (Uses)
(styrene-butadiene rubber, Epofriend A 1005, in **porous**
substrates of **membranes**; in **proton-**
conductive electrolyte membranes for
polymer-electrolyte fuel cells)

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